

# Three Phase Squirrel Cage Induction Motors

MA - A4 - B4 - B5 SERIES  
63 - 400 SIZES  
TECHNICAL CATALOGUE



**MarelliMotori** is part of the FKI group of companies serving the world in the sectors of power generation, transmission and distribution. With over one hundred years of experience, **MarelliMotori** is a name synonymous with **Quality** and **Manufacturing Excellence** in the production of **rotating machines**.

**MarelliMotori** is recognised as a leading supplier to the Industrial, Petrochemical and Marine sectors, offering a complete range of standard and custom solutions for **low and medium voltage motors and generators**.



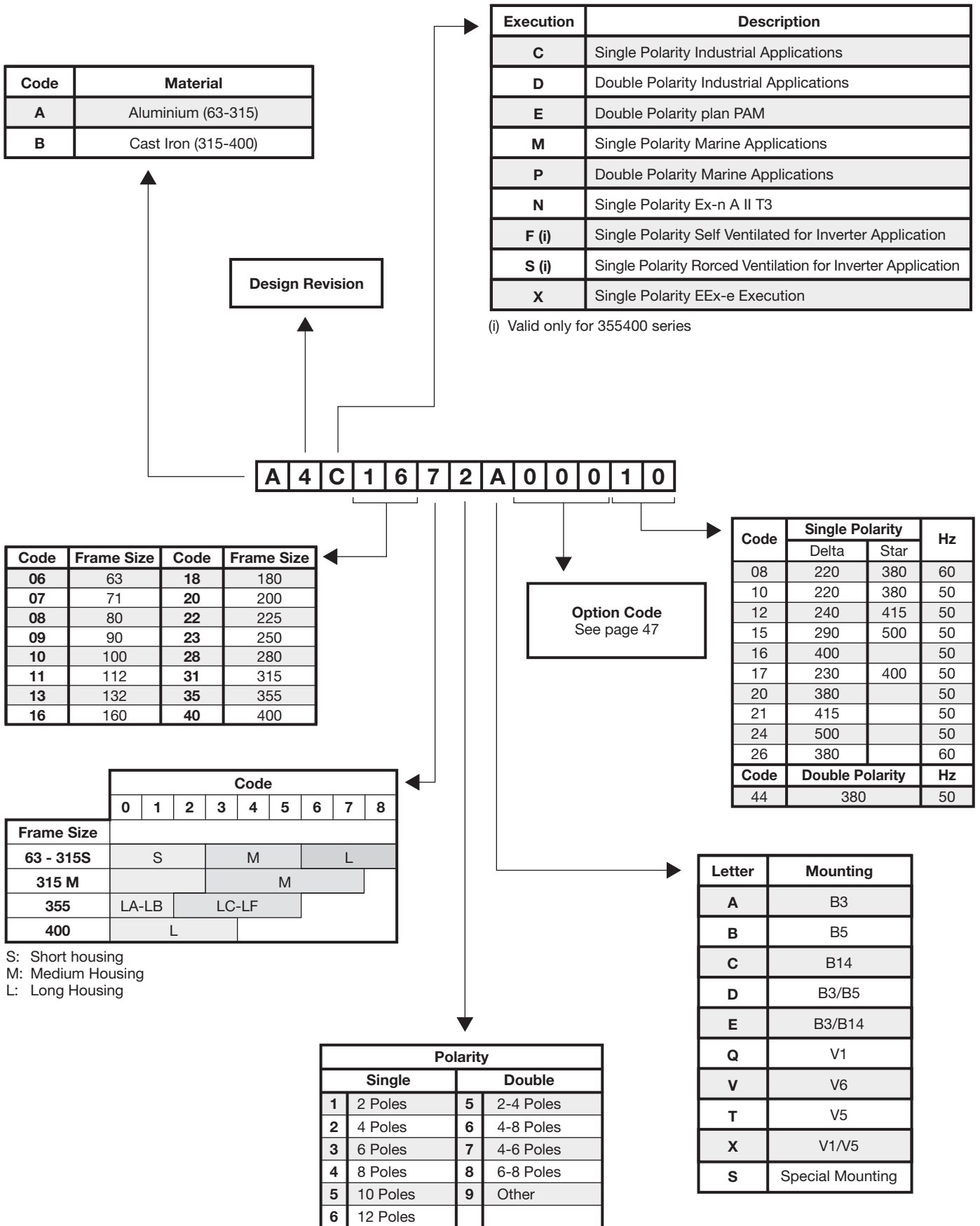
Our products are backed by an organisation of skilled people dedicated to providing the high standard of design, sales, service and technical support demanded by our customers. Our ability to offer flexible and rapid solutions is an integral part of achieving **MarelliMotori's** goal of **Total Customer Satisfaction**.

**CONTENTS****Page**

<b>PRODUCT CODE STRUCTURE</b>	<b>4</b>
<b>RATING PLATES</b>	<b>5</b>
<b>STANDARDS</b>	<b>6</b>
<b>CE MARK</b>	<b>6</b>
<b>ENERGYSAVING</b>	<b>6</b>
<b>TECHNICAL CHARACTERISTICS</b>	<b>6</b>
<b>PROTECTIVE TREATMENT</b>	<b>7</b>
<b>MOUNTINGS AND POSITIONS</b>	<b>8</b>
<b>COOLING</b>	<b>9</b>
<b>MATERIALS</b>	<b>9</b>
<b>BALANCING AND VIBRATION GRADES</b>	<b>10</b>
<b>COUPLING</b>	<b>10</b>
<b>NOISE</b>	<b>10</b>
<b>BEARINGS</b>	<b>11</b>
<b>AXIAL FORCES - HORIZONTAL MOUNTING</b>	<b>14</b>
<b>AXIAL FORCES - VERTICAL MOUNTING</b>	<b>15</b>
<b>RADIAL FORCES</b>	<b>16</b>
<b>CONSTRUCTION FOR HIGH RADIAL LOADS</b>	<b>17</b>
<b>TERMINAL BOXES</b>	<b>18</b>
<b>GROUNDING</b>	<b>20</b>
<b>CONDENSATION DRAINAGE</b>	<b>20</b>
<b>ANTICONDENSATION HEATERS</b>	<b>20</b>
<b>THERMAL PROTECTIONS</b>	<b>20</b>
<b>CONNECTION DIAGRAMS</b>	<b>22</b>
<b>STARTING</b>	<b>24</b>
<b>MOTORS FOR VARIABLE SPEED APPLICATIO</b>	<b>25</b>
<b>STANDARD AND SPECIAL TESTS</b>	<b>27</b>
<b>ELECTRICAL DATA</b>	<b>27</b>
<b>VOLTAGE AND FREQUENCY</b>	<b>29</b>
<b>OUTPUTS AND DERATINGS</b>	<b>30</b>
<b>EUROVOLTAGE</b>	<b>31</b>
<b>DATA TABLES - SINGLE SPEED</b>	
2 poles	<b>32</b>
4 poles	<b>33</b>
6 and 8 poles	<b>34</b>
10 and 12 poles	<b>35</b>
<b>DATA TABLES - DOUBLE SPEED</b>	
2/4 poles and 4/6 poles	<b>36</b>
4/8 poles	<b>37</b>
<b>MECHANICAL TOLERANCES</b>	<b>37</b>
<b>DIMENSIONS</b>	
63 - 132	<b>38</b>
160 - 315	<b>40</b>
355 - 400	<b>43</b>
<b>PART NAME</b>	
63 - 132	<b>45</b>
160 - 315M	<b>46</b>
<b>OPTION CODES</b>	<b>47</b>

# PRODUCT CODE STRUCTURE

MarelliMotori products are identified by a 13 digit code shown on the namaplate. The code is constructed as follows.



## RATING PLATES

All motors in standard execution up to frame size 250 are supplied with aluminium identification plates, however stainless steel plates may be supplied depending on special execution. Frame sizes 280 and above are supplied with stainless steel identification plates. All identification plates are laser engraved with data as shown in the following standard typologies.

Motors subject to efficiency classification "EFF" have the correspondent band label on the nameplate

All motors supplied with regreasing systems have regreasing data shown on the main nameplate.

**132** Frame size

**MA:** Motor series

**MA:** Stator core length code

**4** Polarity

**COD:** 13 digit product code

**I.C.L.:** Insulation class

**h:** regreasing interval (in running hours)

**g:** Quantity of grease each regreasing (in g)

		MARELLI MOTORI		EN60034-1 IEC 34-1				
MOT.3 ~ MA 132 MA 4 - B3		COD. A4C1332A00017		IP 55				
S 1		kg 58						
6308 - 2Z		6208 - 2Z						
Δ	V	Y	Hz	A	Y	kW	min <sup>-1</sup>	cos φ
230	400	50	26	15,3	7,5	1450	0,81	
265	460	60	26	15	8	1750	0,79	
220-240/380-420V-50HZ-28/16A				440V Δ - 60HZ - 15A - 7,9KW				
AD OGNI ASSIEM.RIPRIST. IL GRASSO SU ACCOPP. - BEFORE ASSEMBLY RENEW GREASE ON SHOULDERS								

**FRAME SIZES 63 - 315S**

		MARELLI MOTORI		EN60034-1 IEC 34-1			
MOT.3 ~ B4C 315 MC 4 - B3		COD. B4C3152A00016		IP 55			
S 1		kg 812					
NU 2219 - EC - C3		6316 - C3					
1200 h		30 g		BEACON 3 ESSO			
Δ	V	Y	Hz	A	kW	min <sup>-1</sup>	cos φ
400	-	50	286	-	160	1485	0,85
460	-	60	278	-	176	1785	0,84
AD OGNI ASSIEM.RIPRIST. IL GRASSO SU ACCOPP. - BEFORE ASSEMBLY RENEW GREASE ON SHOULDERS							

**FRAME SIZES 315M**

		MARELLI MOTORI		EN60034-1 IEC 34-1			
MOT.3 ~ B5C 355 LD 2 - B3		COD. B5C3531A00016		IP 55			
S 1		kg 2180					
Δ	V	Y	Hz	A	kW	min <sup>-1</sup>	cos φ
400	-	50	666	-	400	2980	0,90
6317 - C3				6317 - C3			
3500 h		30 g		BEACON 3 ESSO			
AD OGNI ASSIEM.RIPRIST. IL GRASSO SU ACCOPP. - BEFORE ASSEMBLY RENEW GREASE ON SHOULDERS							

**FRAME SIZES 355-400**

## STANDARDS

Title	International Standard	National Standard
RATING AND PERFORMANCE	IEC 60034 - 1	CEI EN 60034 - 1
METHODS FOR DETERMINING LOSSES AND EFFICIENCY	IEC 60034 - 2	CEI EN 60034 - 2
CLASSIFICATION OF DEGREES OF PROTECTION (IP CODE)	IEC 60034 - 5	CEI EN 60034 - 5
METHODS OF COOLING (IC CODE)	IEC 60034 - 6	CEI EN 60034 - 6
CLASSIFICATION OF TYPE OF CONSTRUCTION AND MOUNTING ARRANGEMENT (IM CODE)	IEC 60034 - 7	CEI EN 60034 - 7
TERMINAL MARKINGS AND DIRECTION OF ROTATION	IEC 60034 - 8	CEI 2 - 8
NOISE LIMITS	IEC 60034 - 9	CEI EN 60034 - 9
BUILT-IN THERMAL PROTECTION	IEC 60034 - 11	-
STARTING PERFORMANCE OF ROTATING ELECTRICAL MACHINES	IEC 60034 - 12	CEI EN 60034 - 12
MECHANICAL VIBRATION	IEC 60034 - 14	CEI EN 60034 - 14
STANDARD VOLTAGES	IEC 60038	-
STANDARD DIMENSIONS AND OUTPUTS	-	CEI EN 50347
DIMENSIONS AND OUTPUTS FOR ELECTRICAL MACHINES	IEC 60072 - 1	UNEL 13116 / UNEL 13119

### CE MARK

The electric motors described in this catalogue are designed and manufactured in accordance with harmonised European standards. They conform to the applicable European Community directives, specifically:

- 89/336/CEE Electromagnetic Compatibility Directive
- 73/23/CEE Low Voltage Directive
- B9/392/CEE Machine Directive

The motors are stamped with the CE mark, which allows for free trade in the area covered by the European Community.

### ENERGY SAVING

MarelliMotori have undersigned the voluntary agreement with the CEMEP who, in co-operation with the European Commission, designated energy efficiency classes for three phase squirrel cage induction motors, TEFC, 1,1 to 90kW, 2 and 4 pole, rated for 400V, 50Hz, S1 duty in standard design. These classes are identified as eff1, eff2 and eff3 in descending order. The replacement of standard motors with these new designs will lead to the following benefits:

- Increased lifetime of the motor and its bearings, due to reduced operating temperatures
- Better capability of the motor to run under voltage variations, poor voltage and current wave shapes
- Increased resistance to handle overload conditions.

### TECHNICAL CHARACTERISTICS:

#### Continuous duty S1:

The type of duty is indicated by the symbols S1...S9 as defined in standard IEC 60034-1. Duty type S1 refers to operation at a constant load maintained for sufficient time to allow the machine to reach thermal equilibrium.

#### Degree of Protection IP55

The motors in standard execution have **IP55** degree of protection, where:

5 (first number in code):

Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the machine.

5 (second number in code):

Water Protection against the machine from a nozzle from any direction has no harmful effect.

#### 125

IP56 protection can be provided upon request.

#### Insulation class F:

Class F insulation systems are utilised in MarelliMotori motors. This is the most common requirement among the industry today. The class F insulation system allows a temperature rise of 105K, measured by the resistance variation method, and a maximum hot spot temperature value of 155°C. The materials and the impregnation systems used make these motors suitable for use in tropical environments, for applications with high vibrations and for applications with high thermal variations.

#### 100

Insulation class H can be provided upon request.

#### Temperature rise compatible with class B:

Class B rise allows a maximum winding temperature rise of 80K under normal running conditions (rated voltage, frequency and load) with maximum ambient temperature of 40°C and altitude below 1000m a.s.l.

#### Installation ≤ 1000m a.s.l.:

The performance of standard motors is considered at a maximum altitude of 1000m above sea level (a.s.l.) with motors running in continuous duty, at nominal voltage and frequency and a maximum ambient temperature of 40°C. The table displayed on page 30 gives the performance variations of the motors when utilised in other conditions.

## PROTECTIVE TREATMENT

### EXTERNAL SURFACES

The **standard painting process** consists of epoxy vinylpolyurethane paint: of a thickness used to ensure an optimum environmental resistance. Standard finishing paint colour is RAL 5010.

 930

A **special painting process**, consisting of epoxy vinyl paint followed by polyacrilic point is available on request This process is particularly recommended for:

- Environments where acids or basic liquids are present;
- Outdoor installations where salt is present;
- Marine applications,
- Environments where anhydridic gases are present.

 919

Other RAL and MUNSELL colours are available on request.

Description	Process	Characteristics	Thickness
Painting	Std F96833	Two component paint formulated with solid epoxy resins modified with vinyl polyamide catalysers	$\geq 50\mu\text{m}$
	On request F96819	Std + additional polyacrilic coat formulated with an aromatic semialiphatic catalyser	$\geq 200\mu\text{m}$
Finishing paint	Std	RAL 5010	
	On request	RAL & MUNSELL colours	

### INTERNAL SURFACES

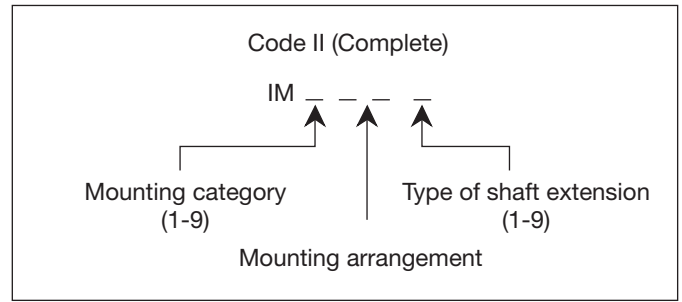
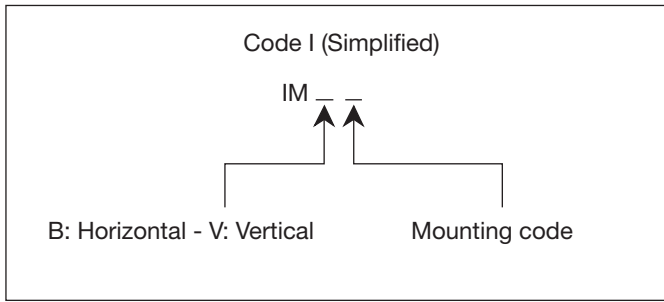
All internal surfaces of motors from 280 frame size are tropicalised with an insulating enamel to prevent motor corrosion due to humidity and agressive substances.

 107

Tropicalisation can also be applied to motors from 63 to 250 frame size on request.

## MOUNTINGS AND POSITIONS

Motors are supplied according to type of construction B3, B5, B3B5, B14, B3B14 and V1 compatible with mounting the arrangements shown in table below as defined in IEC-60034-7. Nameplates are marked with the abovementioned type of construction.



IEC 60034-7			Frame size					
Code I	Code II		63 ÷ 112	132	160 ÷ 250	280 ÷ 315	355	400
IM B3	IM 1001	 1)	●	●	●	●	●	●
IM B35	IM2001	 1) 2)	●	●	●	●	●	●
IM B34	IM 2101	 1) 3)	●	●				
IM B5	IM 3001	 2)	●	●	●	X	X	X
IM B6	IM 1051	 1)	●	●	●	X	X	X
IM B7	IM 1061	 1)	●	●	●	X	X	X
IM B8	IM 1071	 1)	●	●	●	X	X	X
IM B14	IM 3601	 3)	●	●				

IEC 60034-7			Frame size					
Code I	Code II		63 ÷ 112	132	160 ÷ 250	280 ÷ 315	355	400
IM V1	IM 3011	 2)	●	●	●	●	●	●
IM V15	IM 2011	 1) 2)	●	●	●	●	●	●
IM V3	IM 3031	 2)	●	●	●	X	X	X
IM V36	IM 2031	 1) 2)	●	●	●	X	X	X
IM V5	IM 1011	 1)	●	●	●	X	X	X
IM V6	IM 1031	 1)	●	●	●	X	X	X
IM V18	IM 3611	 3)	●	●				
IM V19	IM 3631	 3)	●	●				

- 1) Motors with feet
- 2) Flanged Motors: unthreaded through holes
- 3) Flanged Motors: threaded dead holes

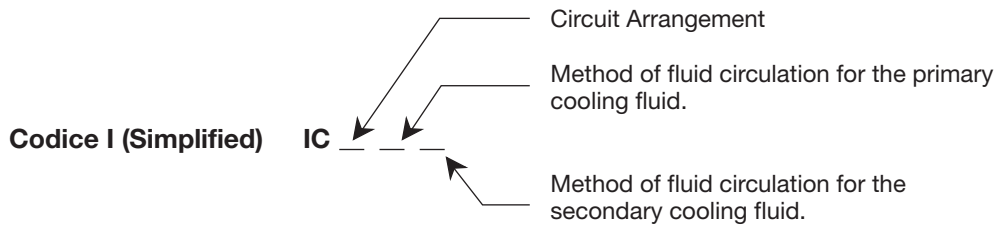
- Standard
- X Consult MarelliMotori

Motor from frame size 100 and above are supplied with lifting eye bolts displaced according to type of construction B3 whereas they will be displaced according to type of construction V1 only if provided with antirain canopy.



## COOLING

The designation of cooling method is given by IC (International Cooling) code, according to IEC 60034-6.



Motors in standard execution of frame sizes from 63 to 400 are supplied with IC 411 cooling systems, incorporating a bi-directional fan. All frame sizes can be supplied with cooling system IC 418 on request.

177

Motors with frame sizes from 90 to 400 can be supplied with cooling system IC 416 on request.

IC 411 Standard	Self ventilating motor. Enclosed machine. Externally finned. External sbaff-mounted fan.	
IC 416 On request	Motor with assisted ventilation. Enclosed machine. Externally finned. Independent external fan mounted inside the fan cover.	
IC 418 On request <sup>1)</sup>	Motor with external ventilation. Enclosed machine. Externally finned. Ventilation provided by air flowing from the driven system.	

1) Consult MarelliMotori

## MATERIALS

The mechanical components used in MarelliMotori motors are made of the materials shown in the table below.

Components	Frame size									
	63 - 112	132	160 - 180M	200	225 - 280	315S	315S	355	400	
Frame	2 poles	Aluminium					Cast iron	Cast iron		
	≥ 4 poles	Aluminium					Aluminium	Cast iron		
Ebdshields	D-end B3	Aluminium			Cast iron					
	D-end B5	Aluminium	Cast iron							
	D-end B14	Cast iron								
	N-end	Aluminium				Cast iron				
Fan cowl	Steel							Fibreglass		
Fan	2 poles	Polypropylene					Polyamide		Polyamide	
	≥ 4 poles	Polypropylene					Polyamide		Aluminium	
Terminal box	Aluminium		Steel					Cast iron		

## BALANCING AND VIBRATION GRADES

The motors are dynamically balance with a half key applied to the shaft extension in accordance with standard IEC 60034-14 to vibration severity grade normal (A) in standard execution. The following table indicates the maximum vibration grades with respect to varying shaft heights.

Large vibrations may occur on motors installed at site, due to various factors such as unsuitable foundations or reaction caused by the driven load. In such cases checks should also be carried out on each element of the installation.

 133

Motors can be supplied with a special (B) vibration level on request.

Vibration Grade	Shaft height mm	66 ≤ H ≤ 132			132 < H ≤ 280			H > 280		
	Mounting	Displac. μm	Vel. mm/s	Acc. m/s <sup>2</sup>	Displac. μm	Vel. mm/s	Acc. m/s <sup>2</sup>	Displac. μm	Vel. mm/s	Acc. m/s <sup>2</sup>
A	Free suspension	25	1,6	2,5	35	2,2	3,5	45	2,8	4,4
	Rigid mounting	21	1,3	2	29	1,8	2,8	37	2,3	3,8
B	Free suspension	11	0,7	1,1	18	1,1	1,7	29	1,8	2,8
	Rigid mounting	-	-	-	14	0,9	1,4	24	1,5	2,4

The instrumentation can have a measurement tolerance of ± 10%.

The free suspension condition is achieved by suspending the machine on a spring or by mounting on a elastic support (springs, rubber, etc;)

## COUPLING

Elastic or flexible couplings have to be correctly effected in order to avoid the transmission of axial and/or radial loads to the motor shaft and bearings.

The permissible radial loads with regards to belt coupling are indicated in the table on page 16.

## NOISE

The following table contains the medium values of A-sound pressure level (LpA), measured at a one metre distance according to standard ISO R 1680. The sound levels are measured in no-load conditions and have tolerances of 3dB(A). At 60Hz the values of sound pressure increase by approximately 4dB(A).

 179

To reduce noise levels, a special fan can be fitted to motors from frame size 225 on request.

To check possible corresponding deratings, consult Marelli Motori.

Frame size	A-sound pressure level (LpA) - [dB(A)]			
	2 poles LpA	4 poles LpA	6 poles LpA	8 poles LpA
63	53	48	50	-
71	58	49	52	52
80	62	49	53	53
90	66	49	56	56
100	69	56	58	58
112	69	56	58	58
132	70	58	60	60
160	78	65	62	61
180 M	78	65	-	-
180 L	80	69	63	62
200	80	69	63	62
225	84	74	66	63
250	84	74	66	63
280	84	77	72	72
315 S	83	77	72	72
315 M	83	78	74	74
355	82	79	75	70
400	82	81	76	73

## BEARINGS

The theoretical lifetime of bearings, L10h according to ISO 281-1 standard, of standard horizontal construction motors, without external forces (radial and/or axial) is in excess of 50 000 hours. The lifetime of bearings is determined by multiple factors and specifically by:

- the lifetime of the grease (mainly on double screen bearings),
- the environmental conditions and working temperature,
- the external loads and vibrations.

The motors  $\leq$  132 frame size have double screen prelubricated ball bearings. The correspondent grease life under normal operating conditions for a motor with horizontal shaft, at 50Hz and maximum ambient temperature of 40°C is

- 10 000 hours in continuous duty for 2-pole motors,
- 20 000 hours in continuous duty for 24-pole motors.

The motors from 160 to 250 frame size have single screen prelubricated ball bearings (without grease nipples).

The motors from 280 frame size and above have regreasable bearings (with grease nipples Tecalemit UNI type) and the relative exhausted grease drainage.

The lubrication intervals of motors without grease nipples and the relubrication intervals of motors with grease nipples are shown in the tables below.

The shown values refer to normal operating conditions for a motor horizontally mounted in ambient temperature of 25°C.

At 40°C ambient, the motors need more frequent lubrications and the correspondent greasing intervals will be half of those given in the tables.

### Motors without grease nipples

Frame size	Lubrication interval [hours]							
	3600 min <sup>-1</sup>	3000 min <sup>-1</sup>	1800 min <sup>-1</sup>	1500 min <sup>-1</sup>	1200 min <sup>-1</sup>	1000 min <sup>-1</sup>	900 min <sup>-1</sup>	750 min <sup>-1</sup>
160 - 180	14000	15000	24000	28000	28000	28000	36000	36000
200	11000	14000	22000	24000	24000	24000	32000	32000
225	11000	14000	20000	22000	22000	22000	32000	32000
250	10000	11000	19000	22000	22000	22000	28000	28000

### Motors with grease nipples

Grandezza	Lubrication interval [hours]							
	3600 min <sup>-1</sup>	3000 min <sup>-1</sup>	1800 min <sup>-1</sup>	1500 min <sup>-1</sup>	1200 min <sup>-1</sup>	1000 min <sup>-1</sup>	900 min <sup>-1</sup>	750 min <sup>-1</sup>
280 - 315S	5200	5600	2800	3400	3400	5600	5600	6800
315M	4800	5600	2400	2800	2800	4800	4800	6000
355 - 400	5600	7000	12600	14600	16800	18000	18000	18000

 138

Motors 160 - 250 frame sizes can be supplied with grease nipples and the relative exhausts grease relief valve on request.

The motors with grease nipples have the type of grease, the quantity and the relubrication interval indicated on the nameplate.

## BEARINGS FOR STANDARD MOTORS

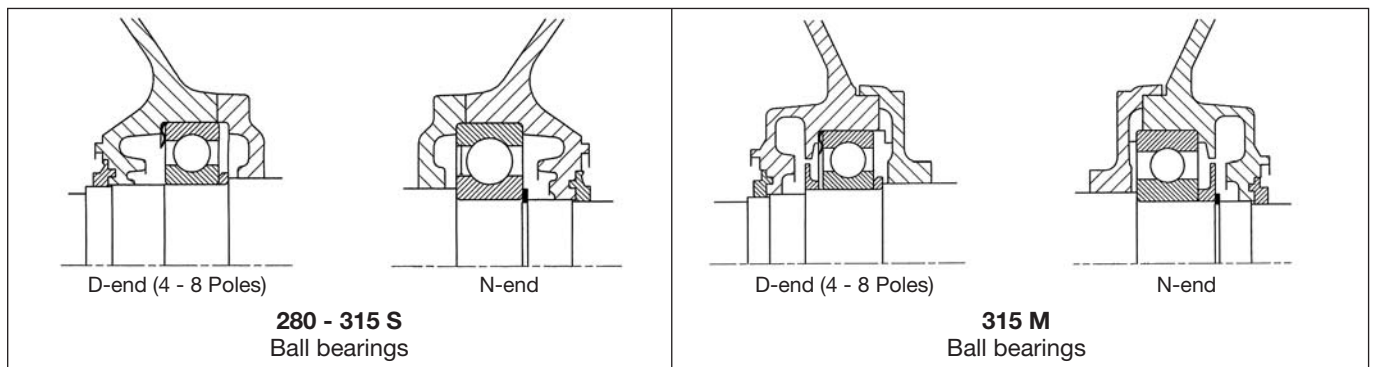
Type	Frame size	Poles	D-end		N-end	
			Horizontal	Vertical	Horizontal	Vertical
MA	63	◆	6201-2Z		6201-2Z	
MA	71	◆	6202-2Z		6202-2Z	
MA	80	◆	6204-2Z		6204-2Z	
MA	90	◆	6205-2Z		6205-2Z	
MA	100	◆	6206-2Z		6206-2Z	
MA	112	◆	6306-2Z		6206-2Z	
MA	132	◆	6308-2Z		6208-2Z	
A4C	160	◆	6310-Z-C3		6209-Z-C3	
A4C	180 M	◆	6310-Z-C3		6209-Z-C3	
A4C	180 L	◆	6310-Z-C3		6210-Z-C3	
A4C	200	◆	6312-Z-C3		6210-Z-C3	
A4C	225	◆	6313-Z-C3		6213-Z-C3	
A4C	250	◆	6314-Z-C3		6213-Z-C3	
A4C	280	2	6314-Z-C3		6314-Z-C3	
A4C	280	≥ 4	NU 2217-EC-C3		6314-Z-C3	
B4C	315 SM	2	6316-C3		6316-C3	
A4C	315 S	≥ 4	NU 2217-EC-C3		6314-Z-C3	
B4C	315 M	2	6316-C3		6316-C3	
B4C	315 M	≥ 4	NU 2219-EC-C3		6316-C3	
B5C	355	2	6317-C3	6317-C3	6317-C3	7317-BE
B5C	355	≥ 4	6322-C3	6322-C3	6322-C3	6322-C3
B5C	400	2	6317-C3	6317-C3	6317-C3	7317-BE
B5C	400 LA-LB	≥ 4	6322-C3	6322-C3	6322-C3	6322-C3
B5C	400 LC-LD	≥ 4	6322-C3	6322-C3	6322-C3	7322-BE

◆ - All poles

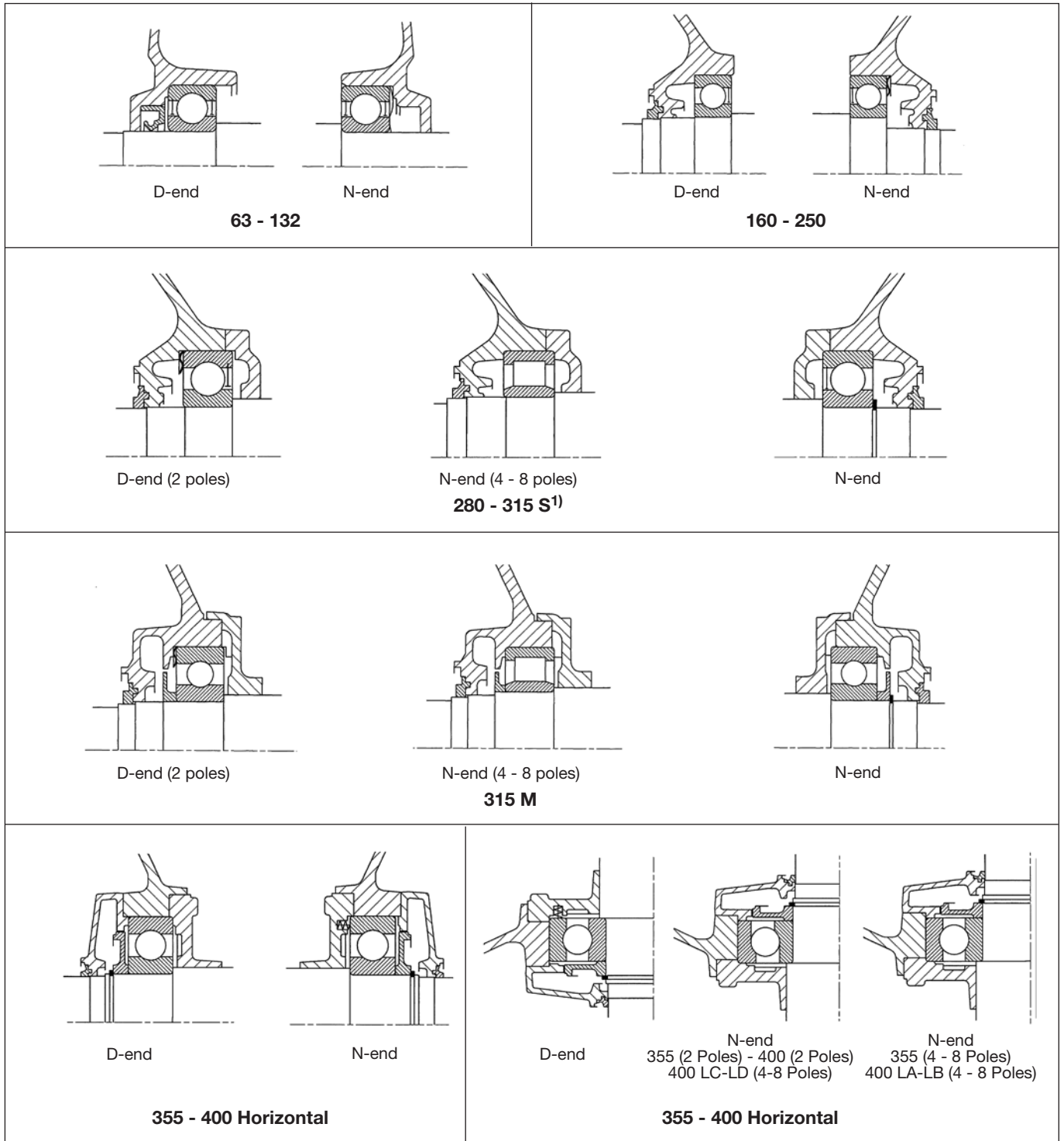
## AXIAL ROTOR POSITION

Frame size	Horizontal arrangement	Vertical arrangement
63 - 250	Preload washer at N-end	
280 - 315	Fixed bearing at N-end	
355 - 400	Fixed bearing at D-end	Fixed bearing at N-end

On request, motors can be supplied with ball bearings on both sides. In these cases the bearings are axially preloaded, as shown in the following diagrams.



## BEARINGS FOR STANDARD MOTORS



1) B4C 315 SM2 in standard execution: bearings without screen

## AXIAL FORCES - HORIZONTAL MOUNTING

- ❑  $L_{10h}=20\ 000$  hours (in accordance with ISO R 281-1);
- ❑ Operating frequency 50Hz;
- ❑ No external radial forces;

Mounting arrangement IM B3, IM B35, IM B34, IM B14 <sup>1)</sup>								
Frame size	Maximum allowed axial force [N]				Maximum allowed axial force [N]			
	2 poles	4 poles	6 poles	8 poles	2 poles	4 poles	6 poles	8 poles
63	250	310	370	/	250	310	370	/
71	275	350	410	460	275	350	410	460
80	450	550	650	730	450	550	650	730
90	485	610	720	810	485	610	720	810
100	670	850	980	1100	690	870	1020	1100
112	990	1200	1450	1600	990	1200	1450	1600
132	1400	1800	2050	2300	1400	1800	2050	2300
160	1100	1400	1600	1800	2200	2800	3200	3500
180	1100	1350	1600	1800	2200	2700	3200	3500
200	1100	1400	1600	1800	2900	3600	4150	4600
225	1900	2300	2700	3000	3300	4000	4600	5200
250	1900	2200	2000	2800	3700	4450	5250	5800
280	3500	4350	5100	5500	3500	4350	5100	5500
315 S	3550	4300	5000	5500	3550	4300	5000	5500
315 M	4000	4850	5600	6200	4000	4850	5600	6200
355 LA-LB	2200	6450	7600	8500	2200	6450	7600	8500
355 LC-LF	2000	6000	7000	8000	2000	6000	7000	8000
400 LA	1950	6200	7400	/	1950	6200	7400	/
400 LB	1850	6000	7100	8200	1850	6000	7100	8200
400 LC	1600	5450	6800	8000	1600	5450	6800	8000
400 LD	/	/	6250	7400	/	/	6250	7400

1) For other mounting arrangements consult MarelliMotori.

The values corresponding to motors running at 60Hz can be obtained by reducing the shown values of 6% (63-315) and of 10% (355-400). For double speed motors the higher speed must always be considered.

## AXIAL FORCES - VERTICAL MOUNTING

- L<sub>10h</sub>=20 000 hours (in accordance with ISO R 281-1);
- Operating frequency 50Hz;
- No external radial forces;

<b>SHAFT EXTENSION DOWNWARDS</b> Mounting arrangement IM V1, IM V15, IM V18 <sup>1)</sup>								
Frame size	Maximum allowable axial force in downwards direction [N]				Maximum allowable axial force in upwards direction [N]			
	2 poles	4 poles	6 poles	8 poles	2 poles	4 poles	6 poles	8 poles
63	310	410	500	/	330	440	540	/
71	330	440	560	640	360	480	600	680
80	540	720	850	980	590	780	930	680
90	550	730	880	1050	630	840	1000	1150
100	750	10850	1250	1400	900	1180	1400	1600
112	1150	1500	1800	2000	1300	1700	2000	2300
132	1600	2100	2500	2900	1950	2500	3000	3450
160	2400	3150	3800	4400	1600	2100	2500	2800
180	2400	3100	3700	4200	1600	2300	2700	3000
200	3000	4000	4900	5400	1800	2350	2800	3100
225	3400	4200	5000	5800	2900	3800	4400	4900
250	3800	4700	5800	6400	2900	3900	4500	5000
280	3300	4000	5300	5900	5300	7300	8200	9100
315 S	3150	3700	4700	5400	5500	7300	8500	9400
315 M	3100	3300	3700	4600	6800	9400	11300	12400
355 LA-LB	11500	5000	5500	6600	1500	14600	17700	19800
355 LC-LF	10300	3000	3100	4100	1900	16200	19600	21800
400 LA	9300	2500	3000	/	1600	16500	19400	/
400 LB	9000	1900	2400	3600	1600	16500	19400	22000
400 LC	8400	19000	23000	27000	2400	18500	20500	22800
400 LD	/	/	20500	23800	/	/	20500	22800

<b>SHAFT EXTENSION UPWARDS</b> Mounting arrangement IM V3, IM V36, IM V19 <sup>1)</sup>								
Frame size	Maximum allowable axial force in downwards direction [N]				Maximum allowable axial force in upwards direction [N]			
	2 poles	4 poles	6 poles	8 poles	2 poles	4 poles	6 poles	8 poles
63	310	410	500	/	330	440	540	/
71	330	440	560	640	360	480	600	680
80	540	720	850	980	590	780	930	680
90	550	730	880	1050	630	840	1000	1150
100	750	1050	1250	1400	900	1180	1400	1600
112	1150	1500	1800	2000	1300	1700	2000	2300
132	1600	2100	2500	2900	1950	2500	3000	3450
160	1100	1440	1690	1950	2900	3800	4500	5050
180	1060	1350	1710	1910	2900	3900	4600	5200
200	900	1200	1450	1700	3900	5100	6100	6800
225	1650	2000	2450	2850	4500	5950	7000	7750
250	1600	1750	2280	2550	5050	6750	7900	8800
280 ÷ 400	2)	2)	2)	2)	2)	2)	2)	2)

1) For other mounting arrangements consult MarelliMotori

2) Consult MarelliMotori

The values corresponding to motors running at 60Hz can be obtained by reducing the shown values of 6% (63-315) and of 10% (355-400). For double speed motors the higher speed must always be considered.

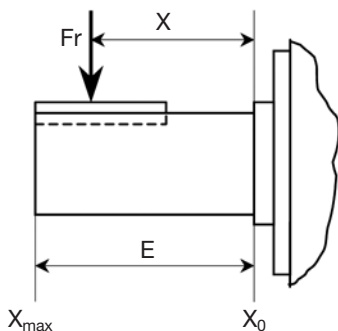
## RADIAL FORCES

The maximum allowable radial forces at the shaft extension ( $X_{max}$ ) and at the shaft collar ( $X_0$ ) for motors having the following characteristics:

- standard construction;
  - horizontal mounting;
  - operating frequency 50Hz;
  - bearing life of 20 000 hours (according to ISO R 281-1);
  - bearing operating temperature between -30°C and +70°C;
- are shown in the following table.

Frame size	2 poles		4 poles		6 poles		8 poles	
	$X_0$ [N]	$X_{max}$ [N]	$X_0$ [N]	$X_{max}$ [N]	$X_0$ [N]	$X_{max}$ [N]	$X_0$ [N]	$X_{max}$ [N]
<b>63</b>	365	250	4600	290	535	305	/	/
<b>71</b>	440	365	550	450	635	500	690	505
<b>80</b>	665	540	835	680	965	740	1100	745
<b>90</b>	730	610	950	785	1110	920	1260	1060
<b>100</b>	1050	855	1320	1080	1560	1270	1770	1450
<b>112</b>	1700	1230	1980	1510	2210	1530	2500	1470
<b>132</b>	2270	1740	2720	2110	3100	2490	3580	2880
<b>160</b>	3370	2670	4200	3320	4810	2950	5400	2950
<b>180</b>	3300	2610	4020	3180	4870	3970	5350	4340
<b>200</b>	4330	3530	5450	4410	6350	4850	7100	4830
<b>225</b>	5050	4230	5950	4760	7000	4230	7600	4100
<b>250</b>	5700	4560	6750	5300	8000	4400	8650	4700
<b>280</b>	5300	4350	See construction for high radial loads					
<b>A4C 315 S</b>	/	/	See construction for high radial loads					
<b>B4C 315 SM</b>	4960	4180	/	/	/	/	/	/
<b>315 M</b>	5850	4930	See construction for high radial loads					
<b>355</b>	4800	4200	10200	8650	11200	9500	12800	10900
<b>400</b>	3450	3100	8300	7300	5800	7500	10400	9100

The external radial forces between the values  $X_0=0$  and  $X_{max}=E$  can be determined from the following linear relationship.



$$F_r = F_{x_0} - \frac{X}{E} * (F_{x_0} - F_{x_{max}})$$

$F_{x_0}$  = maximum radial force on the shaft collar [N].

$F_{x_{max}}$  = maximum radial force at the shaft extension [N].

$E$  = shaft extension length [mm].

$X$  = distance from the point of application of the radial force to the shaft collar [mm].

## CONSTRUCTION FOR HIGH RADIAL LOADS

 129

Admissible maximum external radial loads for motors 4 - 8 poles equipped with roller bearings and having the following characteristics:

- horizontal arrangement;
- feeding frequency of 50Hz;
- theoretical bearing life of 20 000 hours (in accordance with ISO R 280-1);
- bearing operating temperature between -30°C and +70°C.

The N-end bearing is positioned axially with the rotor for all frame sizes.

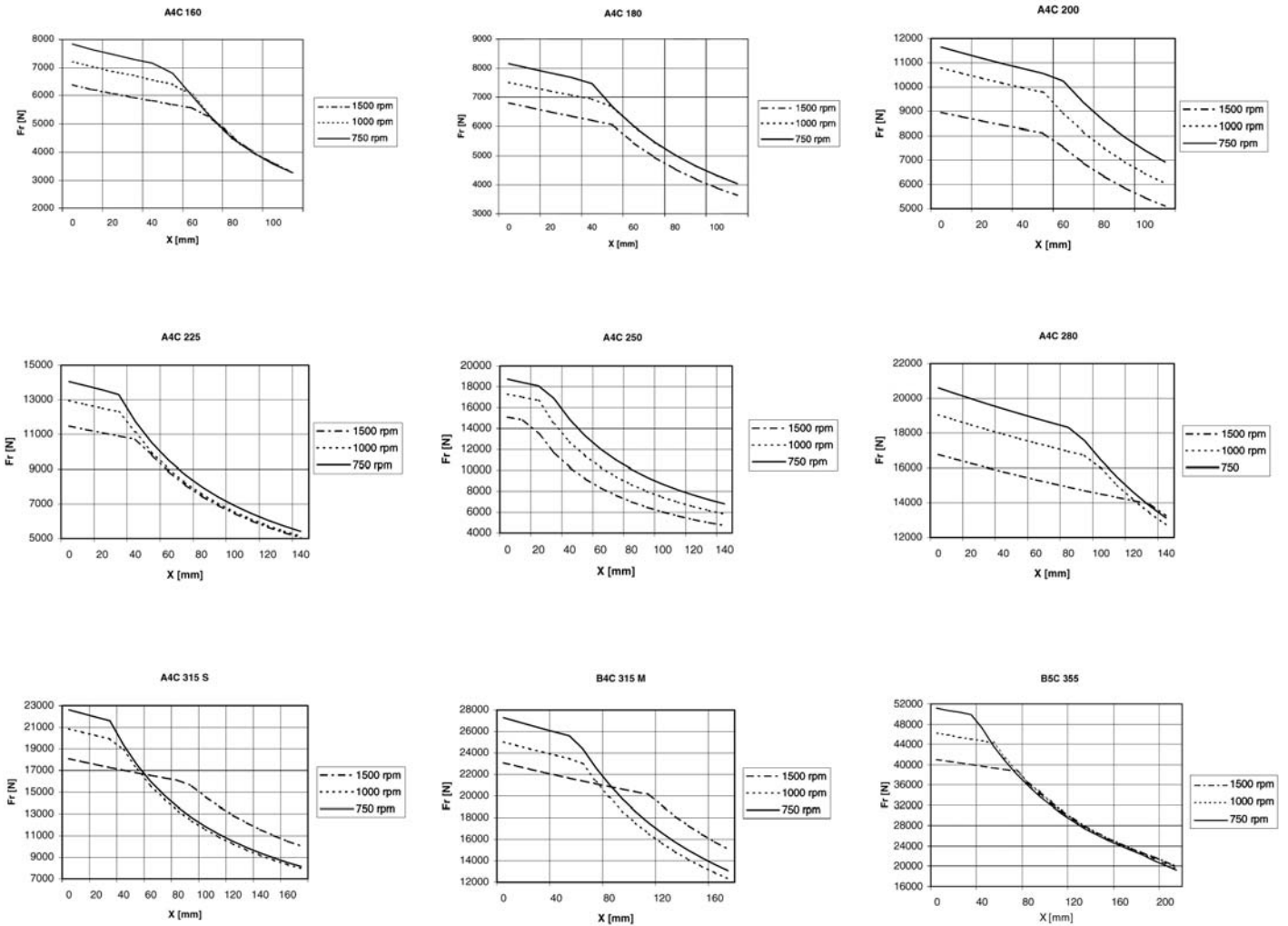


## Motors for high radial loads - bearings

Frame size	4 poles		6 poles		8 poles	
	D-end	N-end	D-end	N-end	D-end	N-end
A4C 160	NU310	6209-Z-C3	NU310	6209-Z-C3	NU310	6209-Z-C3
A4C 180 M	NU310	6209-Z-C3	NU310	6209-Z-C3	NU310	6209-Z-C3
A4C 180 L	NU310	6210-Z-C3	NU310	6210-Z-C3	NU310	6210-Z-C3
A4C 200	NU312	6210-Z-C3	NU312	6210-Z-C3	NU312	6210-Z-C3
A4C 225	NU313	6213-Z-C3	NU313	6213-Z-C3	NU313	6213-Z-C3
AS5 250	NU314	6213-Z-C3	NU314	6213-Z-C3	NU314	6213-Z-C3
A4C 280*	NU2217-EC-C3	6314-Z-C3	NU2217-EC-C3	6314-Z-C3	NU2217-EC-C3	6314-Z-C3
A4C 315 S*	NU2217-EC-C3	6314-Z-C3	NU2217-EC-C3	6314-Z-C3	NU2217-EC-C3	6314-Z-C3
B4C 315 M*	NU2219-EC-C3	6316-Z-C3	NU2219-EC-C3	6316-Z-C3	NU2219-EC-C3	6316-Z-C3
B5C 355	NU322-C3	6322-C3	NU322-C3	6322-C3	NU322-C3	6322-C3
B5C 400	NU322-C3	6322-C3	NU322-C3	6322-C3	NU322-C3	6322-C3

\*Frame sizes 280, 315S, 315M are supplied with bearing construction for high loads as standard. B5C 400: consult MarelliMotori

## CONSTRUCTION FOR HIGH RADIAL LOADS



## TERMINAL BOX AND CABLE ENTRY

The terminal box of MA - A4 - B4 - B5 series motors are placed on top of the electrical machine (considering IM 1001 - B3 as reference) and are normally equipped with 6 leads.

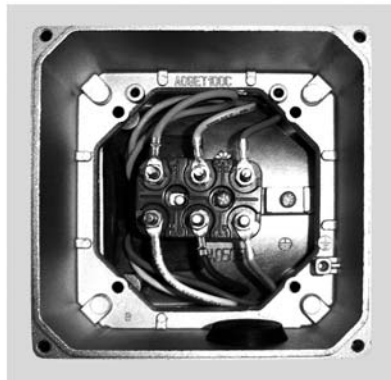
The motors from 100 to 200 frame size included allow the user to mount the terminal box either on the right or the left side, as seen from the drive end side. The terminal box can be rotated in steps of 90° on motors up to 400 frame size.

Frame size	Type of terminal	Terminal thread	Maximum conductor section [mm <sup>2</sup> ]	Maximum cable diameter [mm <sup>2</sup> ]	Clearance holes for metric cableglands
63-80	Threaded Terminal	M4	2,5	14	M20
90-112	Threaded Terminal	M5	6	16	M25 + M32 <sup>1)</sup>
132	Threaded Terminal	M5	6	21	M25 <sup>1)</sup> + M32
160-250	Threaded Terminal	M8	35	38	M40 <sup>1)</sup> + M50 <sup>1)</sup>
280-315S	Threaded Terminal	M12	120	43	2 x M63 <sup>1)</sup>
315 MA-MC	Threaded Terminal	M12	120	43	2 x M63 <sup>1)</sup>
315 MD-ML	Threaded Terminal	M12	120	43	2 x M63
355-400	Flat Coppers Bars	M12	2 x 300	/	Undrilled gland plate

1) : Knockout opening



63-80



90-132



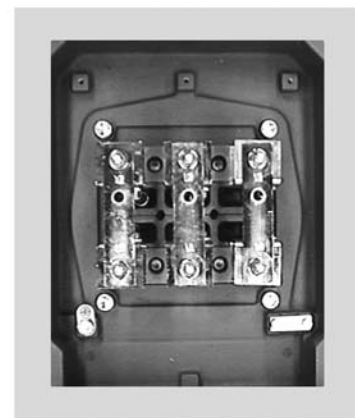
160-250



280-315 MC



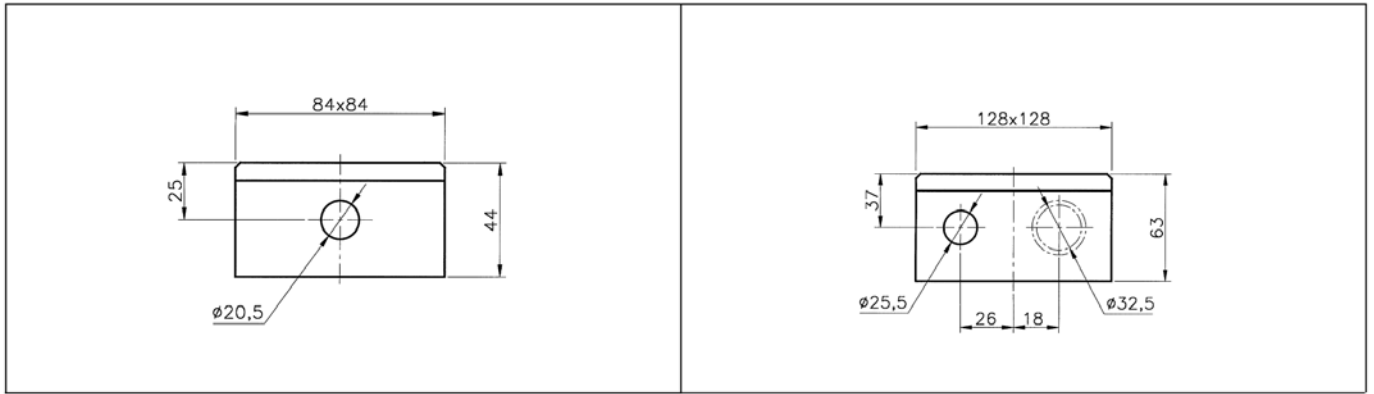
315 MD-ML



355-400

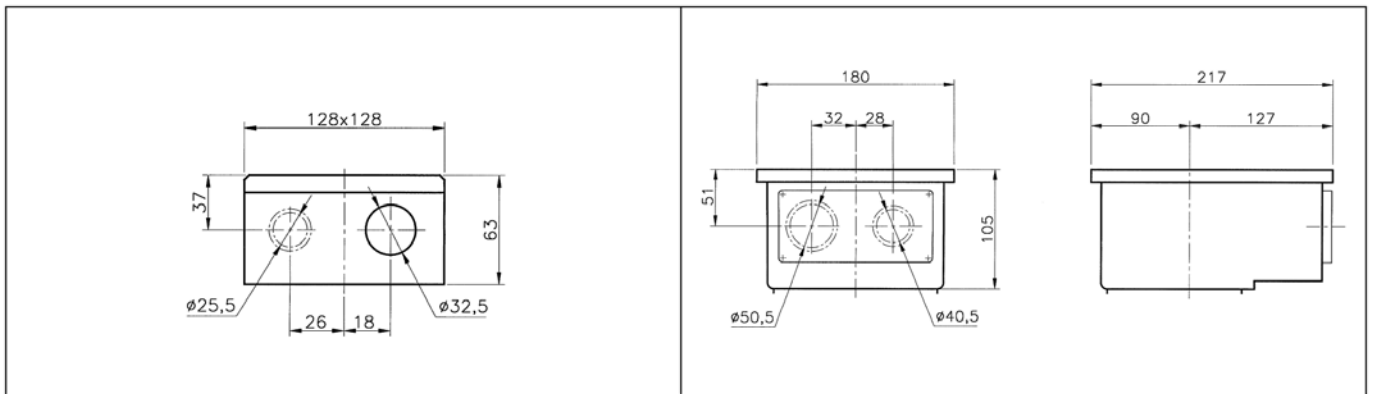
## TERMINAL BOXES - DIMENSIONS

Motors in standard execution are supplied with main terminal box having the following dimensions:



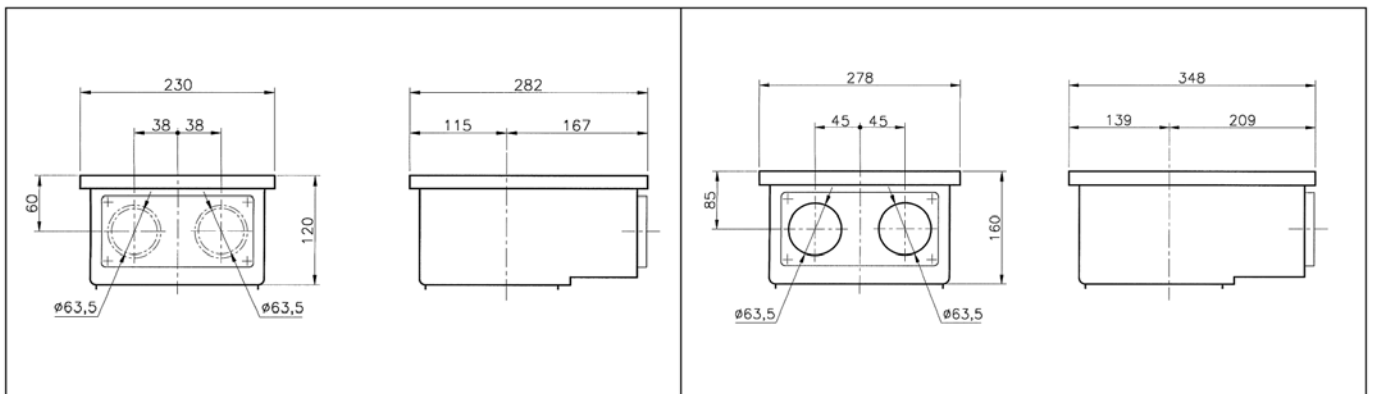
63 - 80

90 - 112



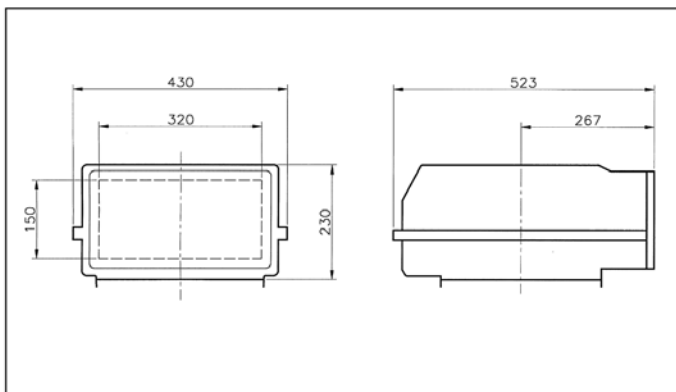
132

160 - 250



280 - 315 MC

315 MD - ML



355 - 400

## GROUNDING

Two terminals exist for grounding, one inside the terminal box and one outside.


## CONDENSATION DRAINAGE

When installed outdoors or used for intermittent work in environments with high humidity levels, motors must be provided with holes for condensation drainage. In order to assure the correct positioning of the holes the operating position of the motors must be specified. Motors with frame sizes from 280 to 400 have holes for condensation drainage as standard.

 131

Motors from 63 - 250 frame size can be supplied with drainage holes on request.

## ANTICONDENSATION HEATERS

 108, 109

Motors subject to atmospheric condensation, either through standing idle in damp environments or because of wide ambient temperature variations, may be fitted with anticondensation heaters. The anticondensation heaters will switch on automatically when the supply of the motor is interrupted, heating the motor to avoid water condensation. The anticondensation heaters are mounted on the D-end winding heads.


Normal feeding voltage is 220/240V.

Motors can be supplied with anticondensation heaters from frame size 100 with terminals in main terminal box (Opt. 108) or, from 160 frame size, with terminals in a separate terminal box (Opt. 109).

The power values normally used are shown in the table below.

Frame size	Power [W]
100 - 112	8
132	25
160 - 180	50
200 - 250	65
280	100
315S	130
315M	200
355	300
400	400

## THERMAL PROTECTIONS

 110, 111, 112, 113, 114, 115

Standard magnetothermal circuit breakers are sufficient to suitably protect the motor from overloading. Anyway the motors can be supplied with additional thermal protections with the characteristics described in the following table.

Additional thermal protection, built-in			
Type	Operating principle	Active temperature [°C]	Frame size where applicable
Bimetallic devices	Motoprotectors with contact normally closed. The disc opens when the winding temperature reaches limits dangerous to the insulation system of the motor.	150	63-400
Positive temperature coefficient thermistors <b>PTC</b>	At the active temperature this device quickly changes its resistance value.	155	63-400
Platinum resistance thermometer <b>PT 100</b>	Variable linear resistance with the winding temperature, particularly suitable for a continuous winding temperature monitoring.	Set up in control panel	160-400

## THERMAL PROTECTIONS - STANDARD AND SPECIAL SOLUTIONS

The solutions applicable to the motors of the present catalogue are described in the following table.

Type	Bimetallic device	Positive temperature coefficient thermistors PTC	Platinum resistance thermometer PT 100
<b>Standard Solution</b>	3 connected in series in windings <sup>1)</sup> (one per phase)	3 connected in series <sup>1)</sup> in windings (one per phase) with connected relay <sup>3)</sup> in control circuit	3 separate Mounting in windings (one per phase) with connected display unit (or recorder)
<b>Terminals</b>	In main terminal box up to frame size 132 (Opt. 110). Either in main (Opt 110) or in separate (Opt. 113) terminal box for 160-400 frame sizes.	In main terminal box up to frame size 132 (Opt. 111). Either in main (Opt 111) or in separate (Opt. 114) terminal box for 160-400 frame sizes.	In main terminal box up to frame size 315S (Opt. 112). Either in main (Opt. 112) or in separate (Opt 115) terminal box for 315M-400 frame sizes.
<b>Special Solution</b>	3 + 3 in series (two sets) Mounting in winding <sup>1)</sup> (two per phase)	3 + 3 in series (two sets) <sup>1)2)</sup> Mounting in windings with (two per phase) connected relay <sup>2)3)</sup> in control circuit.	3 + 3 separate (two sets) Mounting in windings (two per phase) with connected display unit (or recorder) <sup>3)</sup> .
<b>Terminals</b>	Consult MarelliMotori	For frame sizes 160-315S consult MarelliMotori. Either in main (Opt. 111x2) or in separate (Opt. 114x2) terminal box from frame size 315M	For frame sizes 160-315S consult MarelliMotori. Either in main (Opt. 112x2) or in separate (Opt. 115x2) terminal box from frame size 315M

1) : Motors up to 80 frame size are can be provided with a single thermal protection mounted in a winding head.

2) : Active temperatures of both the two sets to be specified at order stage.

3) : Customer's supply.

315M frame size motors are supplied with 3 PTC with terminals in main terminal box, in standard execution. 355 and 400 frame sizes motors are supplied with 3 PTC with terminals in separate terminal box, in standard execution.

 122

Motors from 280 frame size can be supplied with PT100 thermal protectors on the bearings on request

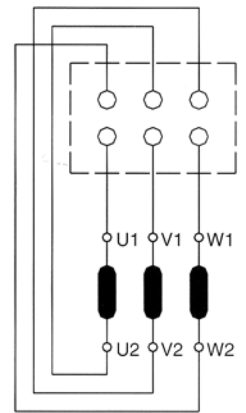
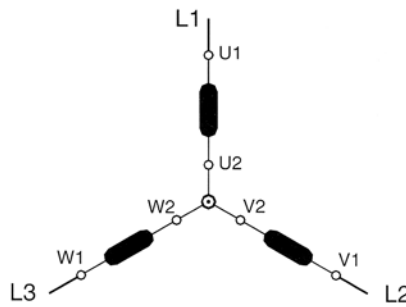
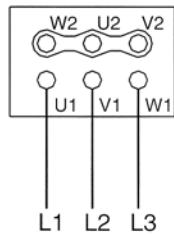
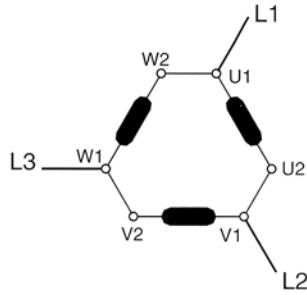
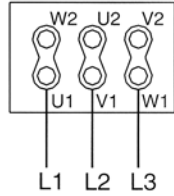
CONNECTION DIAGRAMS

Manually Operated  
External Connection  
Diagram

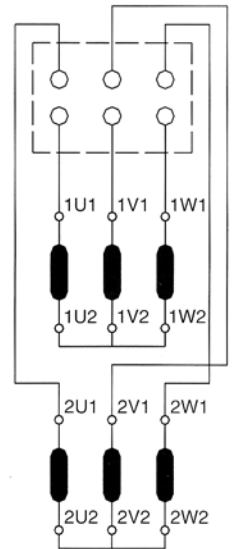
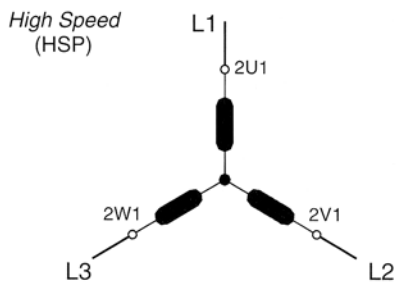
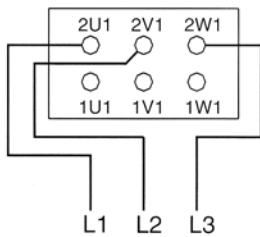
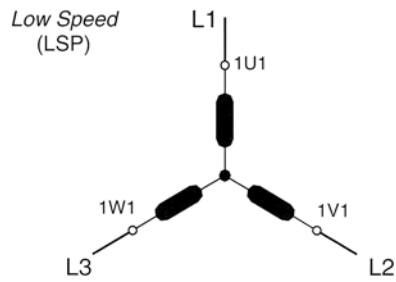
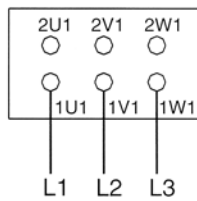
Outline Diagram

Internal Connection

MOTORS WITH 6  
TERMINALS  
Δ / Y CONNECTION



TWO SPEED MOTORS  
WITH 6 TERMINALS AND  
TWO SEPARATE  
WINDINGS



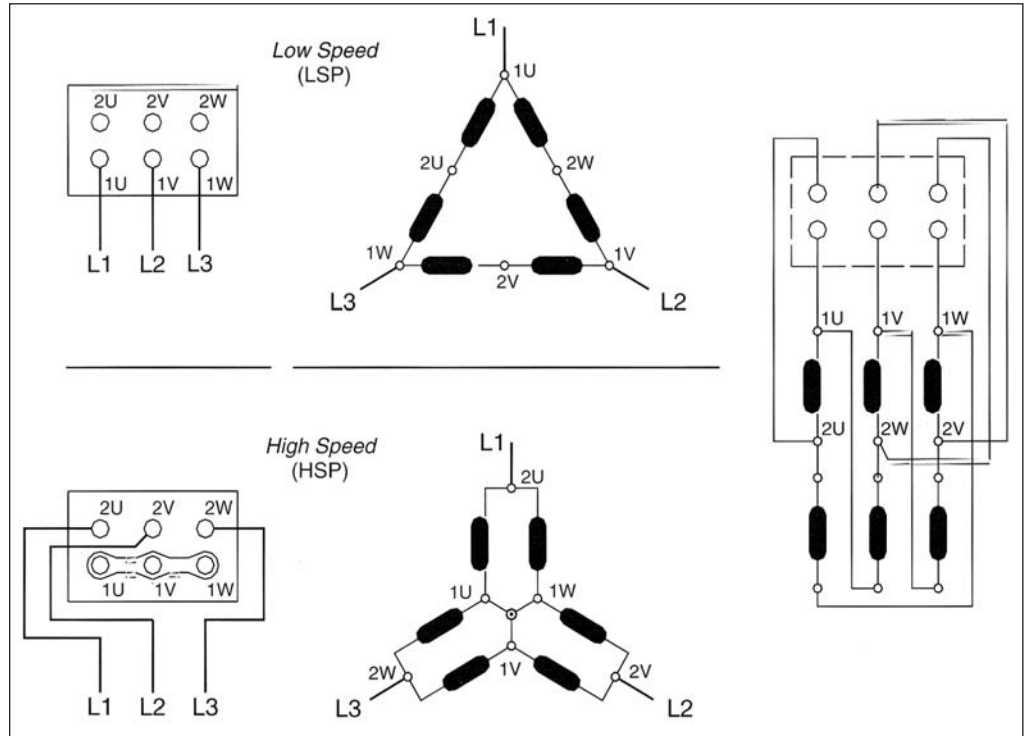
CONNECTION DIAGRAMS

Manually Operated  
External Connection  
Diagram

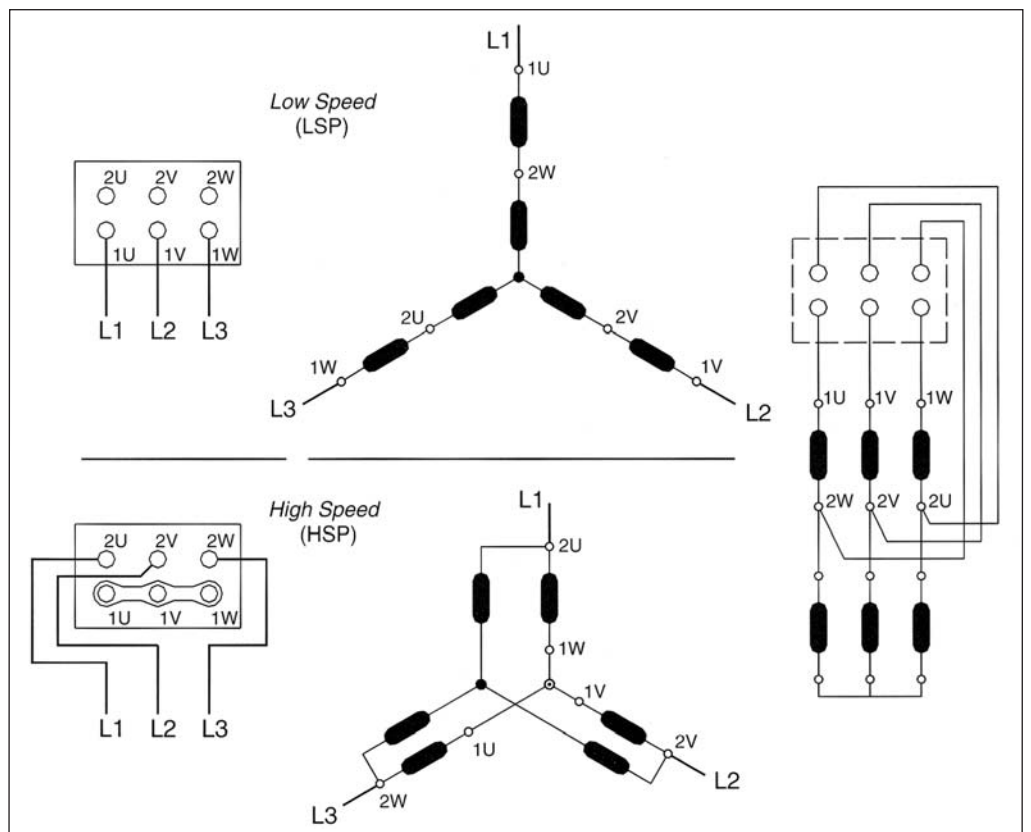
Outline Diagram

Internal Connection

TWO SPEED MOTORS  
WITH 6 TERMINALS  
Δ / YY CONNECTION



TWO SPEED MOTORS  
WITH 6 TERMINALS  
Y / YY CONNECTION



## STARTING

The performances of a motor during startings are related to the corresponding feeding voltage by the following relationships:

- The starting (or short circuit) current is almost proportional to the feeding voltage:  $I_{CC} \propto V_{Feed}$ .
- The starting torque ( $C_S$ ) and the maximum torque ( $C_M$ ) of the motor are proportional to the square of the feeding voltage:  $C_S \propto V_{Feed}^2$ .

### STARTING RESPONSE

The starting current values given in p.u. detailed in the present catalogue allow to calculate the starting current rms values, and so measured after some sinusoidal periods from insertion: in the first instant it is possible to have peak currents which can be up to 2.5 times the stable values. The amplitude of the peaks depends essentially on the instantaneous value of the sinusoidal supply voltage at the moment of insertion. These peaks are rapidly damped. The starting torque peaks, having an analogue behaviour, come considerably attenuated by the inertia of the motor and of the coupling load, with negligible resulting stress of the shaft and coupling.

### TYPE OF STARTING

The most common starting methods of a three phase induction motor are:

#### 1. Direct-on-line starting

Starting by means of direct insertion at the feeding line. In these conditions the starting torque and current values are those given in the catalogue.

#### 2. Star -Delta starting

This starting method can be adopted in cases where the resistant torque is very low and low starting currents are requested. With this method the leading torque and current, in the starting phase, come reduced by 28% to 30% of the value indicated in the this catalogue, with a negligible transient at delta insertion.

#### 3. Starting through soft starter

This device supplies a gradually increasing voltage, limiting the starting current and avoiding abrupt insertion. The amplitude of the current in the starting phase depends directly on the value of the resistant torque of the coupled load, from the inertia of the system and from the pre-set starting times. The device adapts the voltage at the requested torque conditions and allows an energy saving, particularly with starting at low loads.

#### 4. Starting with autotransformer

The use of an autotransformer permits a reduction of the starting current and also results in a lower leading torque by use of similar relationships;

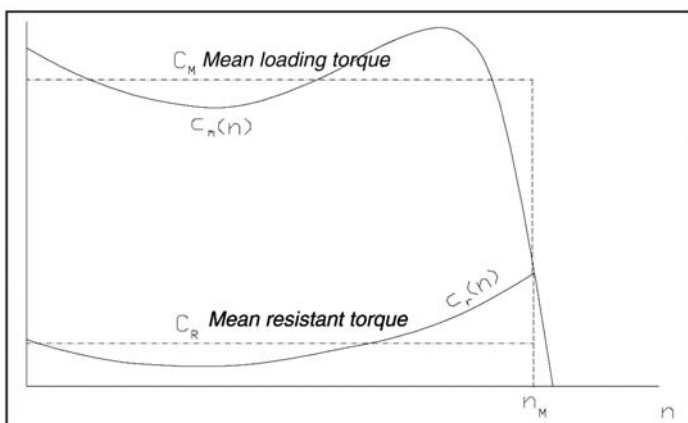
$$I_{AT} = I \cdot \left( \frac{V_{AT}}{V_N} \right)^2 \quad \begin{array}{l} V_{AT} = \text{reduced voltage at exit of autotransformer [V]} \\ I_{AT} = \text{starting current at voltage } V_{AT} \text{ at the entry of autotransformer [A]} \\ V_N = \text{nominal voltage of the motor[V]} \end{array}$$

$$I_M = I \cdot \frac{V_{AT}}{V_N} \quad \begin{array}{l} I_M = \text{starting current at voltage } V_{AT} \text{ at the entry of motor [A]} \\ I = \text{starting current at nominal voltage [A]} \end{array}$$

$$C_{AT} = C \cdot \left( \frac{V_{AT}}{V_N} \right)^2 \quad \begin{array}{l} C = \text{starting torque at nominal voltage [Nm]} \\ C_{AT} = \text{starting torque at voltage } V_{AT} \text{ [Nm]} \end{array}$$

### EXAMPLE OF CALCULATION FOR DIRECTINSERTION

Once the motor suitable to drive the coupled load has been chosen, the calculation of the starting time in the case of direct insertion can be carried out by applying the following simplified method.



By considering the values in the catalogue for the starting torque  $C_S/C_n$ , the maximum torque  $C_{max}/C_n$  and the nominal torque  $C_n$ , it is possible to obtain the mean leading torque by the following relationship:

$$C_M \cong K \cdot C_n \cdot \left( \frac{C_S}{C_n} + \frac{C_{max}}{C_n} \right)$$

Where:

$k \cong 0,40$  for frame  $\geq 160$

$k \cong 0,45$  for frame  $< 160$



The starting time is given by the following relationship:

$$t \approx \frac{2 \cdot \pi}{60} \cdot \frac{\left[ J_M + J_C \cdot \left( \frac{n_C}{n_M} \right)^2 \right] \cdot n_M}{C_M + C_C \cdot \left( \frac{n_C}{n_M} \right)}$$

Where:

- t = starting time [sec]
- n<sub>M</sub> = nominal speed of the motor [min<sup>-1</sup>]
- n<sub>C</sub> = nominal speed of the load (if different from the motor) [min<sup>-1</sup>]
- J<sub>M</sub> = moment of inertia of the motor [kgm<sup>2</sup>]
- J<sub>C</sub> = moment of inertia of the load [kgm<sup>2</sup>]
- C<sub>M</sub> = mean leading torque [Nm]
- C<sub>C</sub> = mean resistant torque [Nm]

For heavy starting, where the inertia of the operating machine is greater than 8 times the inertia of the rotor, consult MarelliMotori.

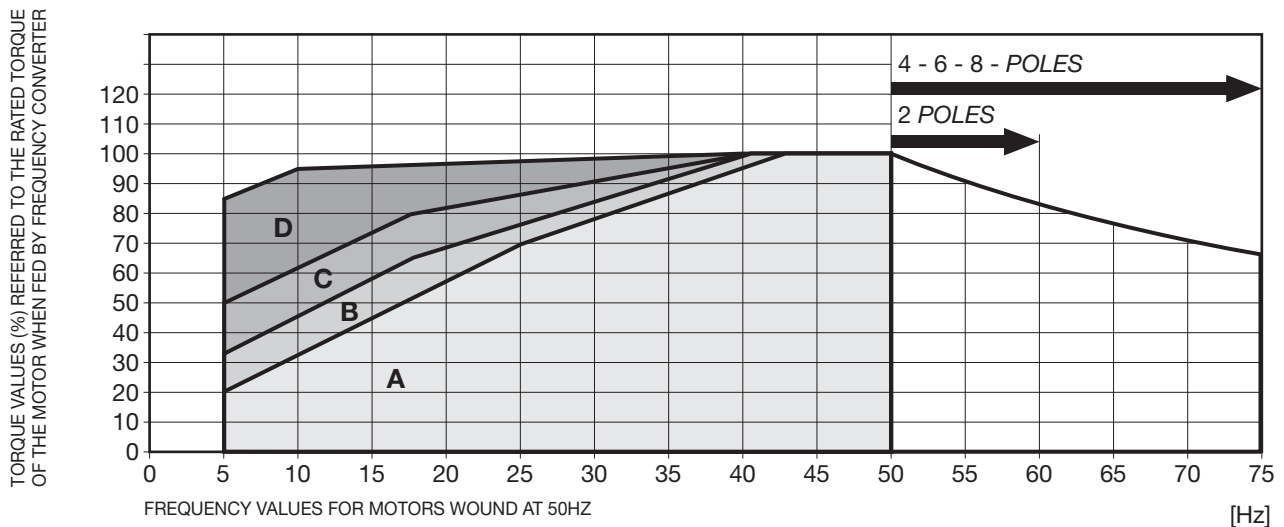
## MOTORS FOR VARIABLE SPEED APPLICATIONS

A.C. motors designed for sinusoidal feeding voltage and constant feeding frequency can, under normal conditions, be used in variable speed applications by means of a frequency converter. Motors for variable speed applications are generally fed by the frequency converter by upholding the relationship  $U_n/f_n$  up to the speed correspondent to the nominal voltage and frequency and, for higher speeds, by increasing the frequency and keeping constant the nominal voltage value. The performances of a motor fed by frequency converter depend on the cooling type: self-ventilated motors are suitable for use at loads with quadratic torque/speed shapes (typical case for pumps and fans).

 177

When constant torque is required from low speeds, forced ventilation must be employed.

Generally the motor type can be chosen referring to the following diagram by considering: the torque diagram of the motor, the speed range, the cooling type



Cooling Method IC411	Poles	Frame size
A	2 / 4 / 6 / 8	>315
A + B	6 / 8	≤315
A + B + C	2 / 4	≤315

Cooling Method IC416	Poles	Frame size
A + B + C + D	2 / 4 / 6 / 8	≤400

For motors from 355 to 400 frame size with cooling method IC411 contact MarelliMotori.

In both cases the resistant torque of the driven machine must be lower than the leading torque of the motor for the total running speed range.

The speed range is set from a minimum frequency  $F_{MIM}$  (typically around 5-10Hz depending on the converter), and a maximum frequency  $F_{MAX}$  dictated by the speed limits of the rotating system and/or the reduction in torque.

The forced ventilation can be supplied as option from 90 frame size and above.

Forced-ventilated Motor			Forced-ventilation Unit			
			380-415V 50Hz		440-475V 50Hz	
Frame size	$\Delta p$ [Kg]	$\Delta l$ [mm]	P [kW]	In [A]	P [kW]	In [A]
90-132	Contact MarelliMotori					
160-180M	5,3	215	0,25	0,82	0,26	0,75
180L-200	5,6	222	0,25	0,82	0,26	0,75
225-250	6,1	232	0,25	0,82	0,26	0,75
280-315S	7,7	248	0,55	1,7	0,58	1,4
315M	32	250	0,55	1,7	0,58	1,4
355	54	340	1,85	4,3	2,04	4,0
400	53	415	2,20	4,9	2,42	4,7

 178

The use of the converter requires some precautions regarding the voltage peeks and wave-fronts which it transmits to the motor terminals. The values of the aforementioned peeks are dependent on the supply voltage of the frequency converter and it results in an amplification relative to the motor feeding cable length.

For peak values higher than 1000V at motor terminals and/or for nominal voltages higher than 500V and/or voltage-fronts  $du/dt > 500V/\mu s$  at motor terminals, MarelliMotori suggests a reinforced insulation system for the motor and/or the interposition of appropriate filters between the motor and converter.

	Standard insulation	Enhanced insulation	Filter*
$U_n \leq 500 V$ $du/dt < 500V/\mu s$	X		
		X	
$500 V < U_n \leq 690V$			X

\*: The filter is bound to the characteristics of the converter and therefore any inquiries should be directed to the converter manufacturer.

 175

Motors fed by frequency converter can be subject to voltages between the D-end and N-end bearing arrangements. This is due to the effects of the feeding system. The values of the aforementioned voltages depend on the characteristics of the frequency converter and on the dimensions of the motor itself. For motors from 315 frame size or those where the shaft peak voltage exceeds 500mV, MarelliMotori suggest to insulate one of the bearing arrangements of the motor. Normally this solution is applied to the N-end of the motor.

These guidelines, coupled with the correct grounding of the operating system, motor and coupled machine, guarantee the best results.

## STANDARD AND SPECIAL TESTS

All MarelliMotori products are subject to routine tests performed in accordance with CEI/IEC standards. On request the following tests can be carried out.

<b>Standard Test</b>	<b>Reduced</b> <ul style="list-style-type: none"> <li>• Measurement of winding resistance (cold).</li> <li>• High voltage test plus insulation resistances immediately before and after test</li> <li>• Dielectric test</li> <li>• No load test</li> <li>• Locked rotor test</li> </ul>
	<b>Complete (= Reduced +)</b> <ul style="list-style-type: none"> <li>• Full load winding temperature with method by resistance variation.</li> <li>• Determination of efficiency and power factor at 1/4, 1/2 and 3/4 of load.</li> </ul>
<b>Extra Test</b>	<ul style="list-style-type: none"> <li>• On-load test with variable voltage.</li> <li>• Measurement of curve C=f(n).</li> <li>• Measurement of variation in accordance with IEC 60034-14.</li> <li>• Measurement of noise level. Determination of NRN (in accordance with IEC 60034-9).</li> <li>• Verification of IP protection degree in accordance with IEC 60034-5.</li> </ul>

## ELECTRICAL DATA

Electrical tolerances in accordance with standard IEC 60034-1.

Power factor	-1/6 di (1-cosφ)	min. 0,02 max. 0,07	Locked rotor current	+20% of guaranteed value
Efficiency	-15% -10% di (1-η)	Pn ≤ 50kW Pn > 50kW	Locked rotor torque	+15% +20% of guaranteed value
Speed	±20% ±30% of guaranteed slip	Pn ≥ 1kW Pn < 1kW	Pull out torque	-10% of guaranteed value

## PERFORMANCE AT 60 Hz

The motors wound for V = 230/400V and V = 400V - 50Hz, when operating at the voltage and frequency values shown in the tables of page 28, have performances which can be obtained by applying the following formulas:

Rated output

$$kW_{(...V60Hz)} = kW_{(400V50Hz)} \times Kn$$

[kW]

Starting torque

$$Ts/Tn_{(...V60Hz)} \approx Ts/Tn_{(400V50Hz)} \times \left(\frac{...V60Hz}{480}\right)^2 \times \frac{1,2}{Kn} \quad [p.u.]$$

Nominal torque

$$Tn_{(...V60Hz)} = \frac{Tn_{(400V50Hz)}}{1,2} \times Kn$$

[Nm]

Starting current

$$Is/In_{(...V60Hz)} \approx Is/In_{(400V50Hz)} \times \left(\frac{...V60Hz}{480}\right)^2 \times \frac{1,2}{Kn} \quad [p.u.]$$

Breakdown torque

$$Tmax/Tn_{(...V60Hz)} \approx Tmax/Tn_{(400V50Hz)} \times \left(\frac{...V60Hz}{480}\right)^2 \times \frac{1,2}{Kn} \quad [p.u.]$$

Speed

$$rpm_{(...V60Hz)} \approx rpm_{(400V50Hz)} \times 1,2 \quad [min^{-1}]$$

where Kn: multiplying factor (Kn values are given in the following page)

MOTOR TYPE SUPPLY VOLTAGE AND FREQUENCY	2 poles				4 poles				6 poles				8 poles			
	400V 60Hz	440V 60Hz	460V 60Hz	480V 60Hz	400V 60Hz	440V 60Hz	460V 60Hz	480V 60Hz	400V 60Hz	440V 60Hz	460V 60Hz	480V 60Hz	400V 60Hz	440V 60Hz	460V 60Hz	480V 60Hz

**MULTIPLYING FACTOR K<sub>n</sub>**  
Motors wound for 400V - delta - 50Hz

MA 100 LA 100 LB	0,95 0,90	1,05 1,00	1,10 1,05	1,20 1,15	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,90 ●	1,00 ●	1,05 ●	1,10 ●	0,90 0,95	1,00 1,05	1,05 1,10	1,10 1,15
112 M	0,90	1,00	1,05	1,15	0,95	1,05	1,10	1,20	0,85	0,90	0,95	1,00	0,90	1,00	1,05	1,10
132 SA 132 SB	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,95 ●	1,05 ●	1,10 ●	1,20 ●	0,90 ●	1,00 ●	1,05 ●	1,10 ●	0,95 ●	1,05 ●	1,10 ●	1,15 ●
132 MA 132 MB	● 0,95	● 1,05	● 1,10	● 1,20	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,85 0,85	0,90 0,90	0,95 0,95	1,00 1,00	1,00 ●	1,10 ●	1,15 ●	1,20 ●
A4C 160 MA 160 MB	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
160 M 160 L	● 1,00	● 1,10	● 1,10	● 1,20	1,00 0,95	1,10 1,05	1,10 1,10	1,20 1,15	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
180 M 180 L	0,95 ●	1,05 ●	1,10 ●	1,20 ●	0,95 1,00	1,05 1,10	1,10 1,10	1,15 1,20	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
200 L 200LA 200LB	● 1,00 1,00	● 1,10 1,10	● 1,10 1,10	● 1,20 1,20	0,95 ● ●	1,05 ● ●	1,10 ● ●	1,15 ● ●	1,00 1,00 1,00	● 1,10 1,10	● 1,10 1,10	● 1,20 1,20	1,00 ● ●	1,10 ● ●	1,15 ● ●	1,20 ● ●
225 S 225 M	● 1,00	● 1,10	● 1,10	● 1,20	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	● 1,00	● 1,10	● 1,10	● 1,20	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
250M	1,00	1,10	1,10	1,20	0,95	1,05	1,10	0,15	1,00	1,10	1,10	1,20	1,00	1,10	1,15	1,20
280 S 280 M 315 S	1,00 1,00 ●	1,10 1,10 ●	1,10 1,10 ●	1,20 1,20 ●	1,00 1,00 1,00	1,10 1,10 1,10	1,10 1,10 1,10	1,20 1,20 1,20	1,00 1,00 1,00	1,10 1,10 1,10	1,10 1,10 1,10	1,20 1,20 1,20	1,00 1,00 1,00	1,10 1,10 1,10	1,10 1,10 1,10	1,20 1,20 1,20
B4C 315 S 315 MA 315 MB	0,95 1,00 ●	1,05 1,10 ●	1,10 1,15 ●	1,15 1,20 ●	● 1,00 ●	● 1,10 ●	● 1,10 ●	● 1,20 ●	● 1,00 1,00	● 1,10 1,10	● 1,10 1,10	● 1,20 1,20	● 1,00 1,00	● 1,10 1,10	● 1,10 1,10	● 1,20 1,20
315 MC 315 MD 315 ME 315 ML	0,95 0,95 ● 0,95	1,05 1,05 ● 1,05	1,10 1,10 ● 1,10	1,15 1,15 ● 1,15	0,95 0,95 ● 0,95	1,05 1,05 ● 1,05	1,10 1,10 ● 1,10	1,15 1,15 ● 1,15	1,00 1,00 ● 1,00	1,10 1,10 ● 1,10	1,10 1,10 ● 1,10	1,20 1,20 ● 1,15	1,00 1,00 ● 1,00	1,10 1,10 ● 1,10	1,10 1,10 ● 1,10	1,20 1,20 ● 1,20
B4C 355 LA 355 LB 355 LC 355 LD 355 LE 355 LF	1,00 1,00 1,00 0,95 0,95 ●	1,05 1,05 1,05 1,05 1,05 ●	1,15 1,15 1,10 1,10 1,10 ●	1,20 1,20 1,15 1,15 1,15 ●	1,00 1,00 1,00 1,00 0,95 0,95	1,10 1,10 1,10 1,10 1,10 1,05	1,10 1,10 1,10 1,10 1,10 1,10	1,20 1,20 1,20 1,20 1,15 1,15	1,00 1,00 0,95 0,95 ● ●	1,10 1,10 1,05 1,05 1,10 1,10	1,10 1,10 1,10 1,10 1,10 1,10	1,20 1,20 1,15 1,15 1,15 1,15	1,00 1,00 0,95 0,95 ● ●	1,10 1,10 1,05 1,05 1,10 1,10	1,10 1,10 1,10 1,10 1,10 1,10	1,20 1,20 1,15 1,15 1,15 1,15

**MULTIPLYING FACTOR K<sub>n</sub>**  
Motors wound for 230 / 400V - delta - 50Hz

MA 63 A 63 B	- -	1,00 1,00	1,05 1,05	1,15 1,15	- -	1,00 1,00	1,05 1,05	1,15 1,15	- -	0,90 0,95	0,95 1,00	1,00 1,05	● ●	● ●	● ●	● ●
71A 71 B	- -	1,00 1,00	1,05 1,05	1,15 1,15	- -	1,00 1,00	1,05 1,05	1,15 1,15	- -	1,00 1,00	1,05 1,05	1,10 1,10	● -	● -	● -	● 1,00
80 A 80 B	0,90 0,90	1,00 1,00	1,05 1,10	1,15 1,20	0,90 0,90	1,00 1,00	1,05 1,05	1,15 1,15	0,90 0,90	1,00 1,00	1,05 1,05	1,10 1,10	0,90 0,90	1,00 1,00	1,05 1,05	1,10 1,10
90 S 90 L	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,90 0,90	1,00 1,00	1,05 1,05	1,10 1,10	0,90 0,90	1,00 1,00	1,05 1,05	1,10 1,10
100 LA 100 LB	0,95 0,90	1,05 1,00	1,10 1,05	1,20 1,15	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,90 ●	1,00 ●	1,05 ●	1,10 ●	0,90 0,95	1,00 1,05	1,05 1,10	1,10 1,15
112 M	0,90	1,00	1,05	1,15	0,95	1,05	1,10	1,20	0,85	0,90	0,95	1,00	0,90	1,00	1,05	1,10
132 SA 132 SB	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,95 ●	1,05 ●	1,10 ●	1,20 ●	0,90 ●	1,00 ●	1,05 ●	1,10 ●	0,95 ●	1,05 ●	1,10 ●	1,15 ●
132 MA 132 MB	● 0,95	● 1,05	● 1,10	● 1,20	0,95 0,95	1,05 1,05	1,10 1,10	1,20 1,20	0,85 0,85	0,90 0,90	0,95 0,95	1,00 1,00	1,00 ●	1,10 ●	1,15 ●	1,20 ●
A4C 160 MA 160 MB	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
160 M 160 L	● 1,00	● 1,10	● 1,10	● 1,20	1,00 0,95	1,10 1,05	1,10 1,10	1,20 1,15	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
180 M 160 L	0,95 ●	1,05 ●	1,10 ●	1,20 ●	0,95 1,00	1,05 1,10	1,10 1,10	1,15 1,20	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
200 L 200 LA 200 LB	● 1,00 1,00	● 1,10 1,10	● 1,10 1,10	● 1,20 1,20	0,95 ● ●	1,05 ● ●	1,10 ● ●	1,15 ● ●	1,00 1,00 1,00	● 1,10 1,10	● 1,10 1,10	● 1,20 1,20	1,00 ● ●	1,10 ● ●	1,15 ● ●	1,20 ● ●
225 S 225 M	● 1,00	● 1,10	● 1,10	● 1,20	1,00 1,00	1,10 1,10	1,10 1,10	1,20 1,20	● 1,00	● 1,10	● 1,10	● 1,20	1,00 1,00	1,10 1,10	1,15 1,15	1,20 1,20
250 M	1,00	1,10	1,10	1,20	0,95	1,05	1,10	1,15	1,00	1,10	1,10	1,20	1,00	1,10	1,15	1,20

- : Power supply which does not meet the operating performances required by the applicable standards

● : Motor type not available

## VOLTAGE AND FREQUENCY

The European reference voltage recommended in IEC 38 Publication is 230/400V three-phase.

The voltages 220/380V and 240/415V of some existing systems will evolve towards the above reference values.

The motors described in the table on page 31 are designed to operate under feeding voltage of 230/400V  $\pm$  10% - 50Hz.

They are therefore suitable for use on the following supply voltages:

- 220/380V  $\pm$  5%

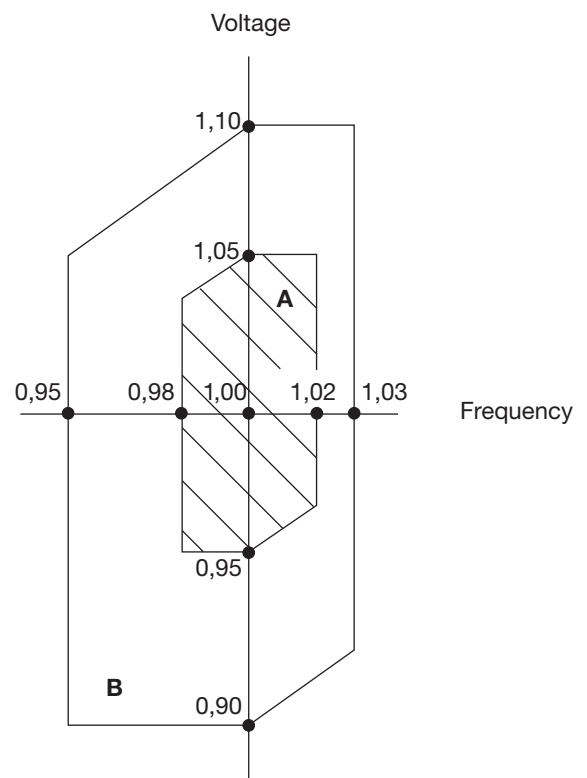
- 230/400V  $\pm$  5% e  $\pm$  10%

- 240/415V  $\pm$  5%.

The motors described in the tables on pages 32-36 have nominal ratings and performances referred to the nominal voltage mentioned in the main nameplate, according to the Standard IEC 60034-1. This Standard classifies voltage and frequency variations in two different areas A and B as shown in the following figure.

Area A - The motor shall be capable of performing its primary function continuously, but doesn't need to comply fully with its performance at rated voltage and frequency and may exhibit some deviations.

Area B - In this area the motor shall be capable of performing its primary function, but may exhibit greater deviations from its performance at rated voltage and frequency than in zone A. Extended operation at the perimeter of zone B is not recommended.



 304

The motors can be wound for special voltage and frequency values, on request

## OUTPUTS AND DERATINGS

The output ratings in the following tables are referred to continuous duty, at 50Hz for rated voltages, an ambient temperature of 40°C and an altitude up to 1000m a.s.l. In different environmental conditions output ratings vary, and are obtainable by applying the factors as indicated in the tables below.

Altitude [m] s.l.m.	Ambient temperature [°C]					
	30	30-40	45	50	55	60
1000	1,07	1,00	0,96	0,92	0,87	0,82
1500	1,04	0,97	0,93	0,89	0,84	0,79
2000	1,00	0,97	0,90	0,86	0,82	0,77
2500	0,96	0,90	0,86	0,83	0,78	0,74
3000	0,92	0,86	0,82	0,79	0,75	0,70
3500	0,88	0,82	0,79	0,75	0,71	0,67
4000	0,82	0,77	0,74	0,71	0,67	0,63

## EFFICIENCY AND POWER FACTOR

The rated output efficiency ( $\eta$ ) and power factors ( $\cos \varphi$ ) are given in the technical data tables for each motor. The values for other loads can be estimated from the following tables.

Efficiency ( $\eta$ ) and power factor ( $\cos \varphi$ ) at									
5/4		4/4		3/4		2/4		1/4	
of rated load									
$\eta$	$\cos \varphi$	$\eta$	$\cos \varphi$	$\eta$	$\cos \varphi$	$\eta$	$\cos \varphi$	$\eta$	$\cos \varphi$
97	0,91	97	0,91	97	0,88	96	0,82	92	0,64
96	0,90	96	0,90	96	0,87	94,5	0,80	90	0,63
95	0,89	95	0,89	95	0,86	93,5	0,79	88	0,60
94	0,88	94	0,88	93,5	0,85	92	0,78	86	0,58
93	0,88	93	0,87	93	0,84	91	0,77	85	0,57
92	0,87	92	0,86	92	0,83	90	0,75	84	0,55
91	0,86	91	0,85	91	0,82	89	0,73	82	0,53
90	0,86	90	0,84	90	0,81	87	0,72	80	0,51
89	0,85	89	0,83	89	0,80	86	0,70	79	0,49
88	0,85	88	0,82	88	0,78	85,5	0,67	78,5	0,47
86	0,83	87	0,81	87	0,76	85	0,66	78	0,45
85	0,82	86	0,80	86	0,75	84,5	0,65	77,5	0,43
84	0,82	85	0,79	85	0,73	84	0,63	77	0,42
83	0,79	84	0,78	84	0,73	83	0,60	76	0,41
82	0,78	83	0,77	83	0,72	81	0,59	74	0,40
81	0,78	82	0,76	82	0,70	80,5	0,58	73	0,38
79	0,77	81	0,75	81	0,69	80	0,56	72	0,36
78	0,76	80	0,74	80	0,67	79	0,54	70	0,36
77	0,75	79	0,73	79	0,66	78	0,52	69,5	0,35
76	0,74	78	0,72	78	0,65	76	0,51	69	0,34
75	0,73	77	0,71	77	0,64	75	0,50	68	0,34
74	0,72	76	0,70	76	0,63	74	0,48	67	0,33
73	0,71	75	0,69	75	0,62	73	0,47	66	0,33
72	0,70	74	0,68	74	0,61	72	0,45	64	0,32
71	0,69	73	0,67	73	0,60	71	0,43	63	0,30
70	0,68	72	0,66	72	0,58	69	0,41	61	0,28
69	0,67	71	0,65	71	0,57	68	0,40	59	0,27
68	0,66	70	0,64	70	0,56	67	0,39	58	0,26
67	0,66	69	0,63	69	0,55	66	0,38	57	0,25
66	0,65	68	0,62	68	0,54	65	0,37	55,5	0,24
64	0,64	66	0,61	65,5	0,53	63	0,36	53,5	0,23
62	0,63	64	0,60	63,5	0,52	61	0,35	52	0,22
60	0,62	62	0,59	61,5	0,51	59	0,34	49	0,21
58	0,61	60	0,58	59,5	0,50	57	0,33	47,5	0,20

# EUROVOLTAGE

## Current values referred to 380V, 400V and 415V - 50Hz

MOTOR TYPE	2 poles						4 poles						6 poles						8 poles					
	380V		400V		415V		380V		400V		415V		380V		400V		415V		380V		400V		415V	
	In A	Is/In p.u.	In A	In A	Is/In p.u.	In A	Is/In p.u.	In A	In A	Is/In p.u.	In A	In A	Is/In p.u.	In A	Is/In p.u.	In A	In A	Is/In p.u.	In A	Is/In p.u.	In A	In A	Is/In p.u.	
MA 63 A	0,49	3,4	0,47	0,50	3,6	0,45	2,8	0,44	0,46	2,9	0,50	1,9	0,49	0,50	2,1									
63 B	0,67	3,6	0,65	0,68	3,8	0,62	2,9	0,63	0,65	3,0	0,59	2,0	0,59	0,58	2,2									
71A	1,00	3,8	1,00	1,00	4,1	0,78	3,6	0,80	0,80	3,8	0,73	2,2	0,70	0,71	2,4									
71 B	1,43	3,9	1,40	1,43	4,2	1,20	3,6	1,20	1,20	3,9	1,01	2,3	1,00	1,00	2,5	0,62	1,9	0,60	0,62	2,1				
80 A	1,75	4,2	1,70	1,74	4,6	1,54	3,6	1,50	1,58	3,8	1,19	3,5	1,20	1,17	3,8	0,68	2,3	0,67	0,67	2,5				
80 B	2,49	5,0	2,40	2,43	5,6	2,02	3,9	2,00	2,07	4,1	1,72	3,5	1,70	1,74	3,7	0,93	2,4	0,92	0,95	2,5				
90 S	3,35	5,0	3,3	3,25	5,5	2,78	3,8	2,7	2,85	4,0	2,07	3,5	2,1	2,06	3,8	1,35	2,9	1,4	1,36	3,2				
90 L	4,85	5,2	4,7	4,78	5,8	3,59	4,4	3,6	3,72	4,6	2,94	4,7	3,0	3,00	4,9	1,93	3,3	1,9	2,01	3,4				
100 LA	6,29	6,1	6,2	6,22	6,7	4,95	4,8	4,9	4,88	5,3	3,83	4,7	3,8	3,96	4,9	2,19	3,8	2,2	2,22	4,1				
100 LB	8,20	6,0	8,0	8,00	6,8	6,51	4,9	6,4	6,42	5,3						3,30	3,9	3,3	3,35	4,2				
112 M	8,1	6,0	7,8	7,8	6,8	8,9	5,1	8,6	8,7	5,7	5,4	4,9	5,4	5,4	5,3	4,3	4,0	4,2	4,3	4,3				
132 SA	11,5	6,0	11,1	11,4	6,5	11,6	5,8	11,4	11,6	6,3	7,3	5,1	7,1	7,2	5,6	5,7	4,2	5,7	15,7	4,5				
132 SB	15,2	6,5	14,8	15,2	7,0																			
132 MA						15,4	6,3	15,3	15,6	6,8	9,3	5,3	9,1	9,2	5,8	7,4	4,1	7,4	7,3	4,5				
132 MB	20,5	6,6	20,8	21,0	7,2	18,1	6,8	17,8	17,8	7,6	13,2	5,8	13,3	13,3	6,3									
A4C 160 MA	22,6	5,7	22,0	22,2	6,3											9,8	3,9	9,7	9,9	4,2				
160 MB	30,0	6,0	29,0	29,4	6,6											12,7	3,9	12,5	12,7	4,3				
160 M						23,1	4,8	22,5	22,3	5,4	15,9	4,6	15,5	15,1	5,3									
160 L	39	6,7	38	38	7,3	31	5,5	30	31	6,0	22,5	5,1	22,0	22,0	5,7	16,8	3,9	16,6	16,7	4,3				
180 M	43	6,5	42	41	7,5	38	5,7	37	37	6,3														
180 L						43	5,8	42	42	6,5	31	4,8	30	30	5,4	25,5	4,2	25	24,8	4,7				
200 L						59	6,2	58	58	6,8						34	4,7	34	34	5,2				
200 LA	56	6,3	54	53	7,2						37	4,7	36	36	5,4									
200 LB	67	6,6	65	64	7,5						43	5,0	41	41	5,7									
225 S						70	6,0	68	65	7,0						40	5,0	40	39	5,5				
225 M	83	6,1	80	79	7,0	83	6,0	80	78	6,9	60	5,9	59	58	6,5	50	4,8	48	48	5,4				
250 M	102	6,2	99	98	7,0	101	5,8	97	94	6,8	74	6,0	72	70	6,8	64	5,3	65	64	5,8				
280 S	136	6,3	133	134	6,9	137	6,6	135	136	7,2	88	5,4	84	83	6,3	73	5,7	73	74	6,1				
280 M	170	6,3	157	160	7,3	164	6,5	157	160	7,2	106	5,5	102	101	6,3	89	5,7	89	88	6,2				
250 M						199	6,5	193	198	7,1	142	5,5	137	137	6,2	106	5,5	106	105	6,0				
B4C 315 S	199	5,7	194	192	6,4	241	5,8	239	236	6,5	171	5,4	163	163	6,2	144	5,7	143	144	6,2				
315 MA	238	5,6	235	232	6,3																			

Multiplying factors for starting and maximum torque values at 380V and 415V

380V 50 Hz	$T_s/T_{n(380)} = [T_s/T_{n(400)}] \times 0,9$
	$T_{MAX}/T_{n(380)} = [T_{MAX}/T_{n(400)}] \times 0,9$

415V 50 Hz	$T_s/T_{n(415)} = [T_s/T_{n(400)}] \times 1,07$
	$T_{MAX}/T_{n(415)} = [T_{MAX}/T_{n(400)}] \times 1,07$

RATED OUTPUT	MOTOR TYPE	SPEED	PERFORMANCE AT RATED OUTPUT				POWER FACTOR	EFFICIENCY 3/4 (LOAD)	FOR D.O.L. STARTING		BREAKDOWN TORQUE	SOUND PRESSURE LEVEL	MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)		
			TORQUE	CURRENT (400V)	EFFICIENCY $\eta$ CLASS				$\cos \varphi$	$\eta$					$I_s/I_n$	$T_s/T_n$
			$T_n$ Nm	$I_n$ A	eff	%										

3000 min<sup>-1</sup> = 2 poles - 50Hz

0,18	MA	63 MA2	2760	0,62	0,47	n.c.	68,6	0,80	67,6	3,7	2,3	2,2	53	0,00020	3,5	
0,25		63 MB2	2790	0,85	0,65	n.c.	70,4	0,79	69,9	3,9	2,4	2,6	53	0,00023	4,0	
0,37		63 MC2•	2790	1,27	1,00	n.c.	69,5	0,77	69,0	4,5	2,7	2,8	53	0,00030	4,8	
0,37		71 MA2	2730	1,3	1,0	n.c.	69,5	0,78	69,0	4,0	2,6	2,7	58	0,00040	5,5	
0,55		71 MB2	2730	1,9	1,4	n.c.	72,3	0,79	72,3	4,2	2,8	2,8	58	0,00045	6,3	
0,75		71 MC2•	2730	2,6	1,9	n.c.	74,1	0,79	74,1	4,2	3,0	3,1	58	0,00057	7,2	
0,75		80 MA2	2830	2,5	1,7	n.c.	74,1	0,84	74,1	4,6	2,0	2,3	62	0,00083	8,0	
1,1		80 MB2	2840	3,7	2,4	2	77,8	0,84	77,8	5,5	2,3	2,5	62	0,00097	9,6	
1,5		80 MC2•	2850	5,0	3,6	2	78,7	0,76	79,2	6,0	3,0	3,1	62	0,00120	10,8	
1,5		90 S2	2800	5,1	3,3	2	79,2	0,84	79,2	5,3	2,3	2,6	66	0,0016	12,9	
2,2		90 L2	2850	7,4	4,7	2	81,1	0,83	80,7	5,7	3,0	3,2	66	0,0022	15,5	
3		90 LB2•	2850	10,0	6,3	3	82,4	0,84	81,0	6,0	3,0	3,2	66	0,0028	17,3	
3		100 LA2	2900	9,9	6,2	2	83,3	0,84	82,6	6,5	2,3	2,9	69	0,0050	22,0	
4		100 LB2•	2900	13,2	8,0	2	84,3	0,86	83,6	6,6	2,1	2,6	69	0,0063	27,0	
4		112 M2	2910	13	7,8	2	85,3	0,87	85,1	6,6	2,1	2,6	69	0,0063	27,0	
5,5		112 MB2•	2910	18	10,8	2	85,7	0,86	85,5	6,6	2,0	2,6	69	0,0078	32,0	
5,5		132 SA2	2910	18	11,1	2	85,8	0,83	85,2	6,5	3,3	3,1	70	0,016	39,5	
7,5		132 SB2	2910	25	14,8	2	87,0	0,84	86,8	7,0	3,5	3,3	70	0,019	45,0	
9		132 MB2•	2910	30	17,0	-	87,8	0,87	87,2	7,1	4,0	3,8	70	0,023	52,0	
11		132 MC2•	2910	36	20,8	3	88,0	0,87	87,7	7,6	3,4	3,8	70	0,028	60,0	
15		132 MD2•	2905	49	29,0	-	88,0	0,85	88,0	6,9	2,8	3,2	70	0,028	62,0	
11	A4C	160 MA2	2920	36	22,0	2	88,4	0,82	88,1	6,2	2,1	2,8	78	0,030	67	
15		160 MB2	2925	49	29,0	2	89,8	0,83	89,6	6,5	2,4	3,0	78	0,035	78	
18,5		160 L2	2940	60	37,8	2	90,7	0,78	90,2	7,2	2,6	3,0	78	0,040	87	
22		180 M2	2930	72	41,7	2	90,8	0,84	91,0	7,1	2,5	3,0	78	0,048	98	
30		200 LA2	2950	97	54	2	92,5	0,87	92,7	6,8	2,4	2,9	80	0,165	130	
37		200 LB2	2950	120	65	2	92,9	0,88	93,1	7,2	2,5	3,0	80	0,180	148	
45		225 M2	2960	145	80	2	92,9	0,88	92,6	6,7	2,4	3,0	84	0,23	210	
55		250 M2	2955	178	99	2	93,0	0,87	92,7	6,7	2,4	3,0	84	0,25	225	
75		280 S2	2960	242	133	2	93,8	0,87	93,6	6,8	2,3	2,7	84	0,35	335	
90		280 M2	2960	290	157	2	94,2	0,88	94,4	7,2	2,3	2,6	84	0,42	378	
110		B4C	315 S2	2970	353	196	n.c.	94,2	0,86	93,5	6,2	2,0	2,1	83	0,95	713
132			315 MA2	2970	424	235	n.c.	94,3	0,86	93,7	6,0	2,0	2,1	83	0,95	713
160	315 MC2		2975	513	280	n.c.	94,9	0,87	94,4	6,0	2,1	2,1	83	1,12	780	
200	315 MD2		2980	640	340	n.c.	95,4	0,89	95,2	6,5	2,1	2,2	83	1,30	840	
200	315 ML2		2980	640	351	n.c.	95,7	0,87	95,2	6,8	2,2	2,6	83	1,60	930	
250	B5C	355 LA2	2980	800	418	n.c.	96,0	0,90	96,0	7,0	2,3	2,3	82	3,7	1620	
315		355 LB2	2980	1008	526	n.c.	96,2	0,90	96,1	7,1	2,2	2,2	82	4,5	1810	
355		355 LC2	2980	1136	591	n.c.	96,4	0,90	96,4	7,2	2,1	2,2	82	5,2	2030	
400		355 LD2	2980	1281	666	n.c.	96,5	0,90	96,4	7,2	2,1	2,1	82	5,9	2180	
450		355 LE2	2980	1441	749	n.c.	96,5	0,90	96,4	7,2	2,2	2,2	82	6,5	2310	
500	B5C	400 LA2	2981	1600	840	n.c.	96,7	0,89	96,7	6,3	1,8	2,0	82	8,2	2680	
560		400 LB2	2982	1792	929	n.c.	96,8	0,90	96,8	6,8	1,7	2,0	82	9,1	2850	
630		400 LC2	2983	2015	1043	n.c.	97,0	0,90	96,9	7,8	2,0	2,2	82	10,0	3030	

n.c. - Rated output excluded by CEMEP agreement,

• - Not included in EN 50347 standards (high output design),

$T_{MAX}$ : Breakdown torque,  $T_s$  Starting torque,  $I_s$  Starting current



RATED OUTPUT	MOTOR TYPE	SPEED	PERFORMANCE AT RATED OUTPUT					POWER FACTOR	EFFICIENCY 3/4 (LOAD)	FOR D.O.L. STARTING		BREAKDOWN TORQUE	SOUND PRESSURE LEVEL	MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)
			TORQUE	CURRENT (400V)	EFFICIENCY $\eta$ CLASS		Is/In			Ts/Tn					
					Tn Nm	ln A					eff				

1500 min<sup>-1</sup> = 4 poles - 50Hz

kW		rpm min <sup>-1</sup>	Tn Nm	ln A	eff	%	cos $\varphi$	$\eta$ %	Is/In p.u.	Ts/Tn p.u.	Tmax/Tn p.u.	Lpa dB(A)	J kgm <sup>2</sup>	Approx. kg
0,12	MA 63 MA4	1370	0,84	0,44	n.c.	59,3	0,66	54,7	3,0	2,6	2,6	48	0,00025	3,5
0,18		1370	1,25	0,63	n.c.	63,0	0,66	61,6	3,0	2,5	2,5	48	0,00030	3,9
0,25		1370	1,74	0,82	n.c.	64,9	0,68	63,5	3,1	2,5	2,7	48	0,00040	4,3
0,25	71 MA4	1380	1,7	0,8	n.c.	67,6	0,68	66,7	3,7	2,5	2,5	49	0,00050	5,3
0,37		1380	2,6	1,2	n.c.	69,5	0,67	69,0	3,8	2,7	2,7	49	0,00060	6,0
0,55		1380	3,8	1,7	n.c.	70,4	0,68	69,9	3,9	2,9	3,0	49	0,00076	6,7
0,55	80 MA4	1380	3,8	1,5	n.c.	72,3	0,73	72,3	3,9	2,3	2,3	49	0,00130	8,4
0,75		1385	5,2	2,0	n.c.	73,2	0,73	73,2	4,1	2,8	2,8	49	0,00160	9,5
0,92		1385	6,3	2,4	n.c.	74,1	0,75	74,1	4,6	2,8	2,8	49	0,00190	10,4
1,1	90 S4	1390	7,5	2,7	2	76,6	0,76	77,7	4,1	2,4	2,5	49	0,0033	12,8
1,5		1395	10,3	3,6	2	79,4	0,76	80,0	4,6	2,5	2,5	49	0,0040	15,0
1,85		1400	12,6	4,3	n.c.	80,6	0,78	81,0	4,7	2,5	2,6	49	0,0048	17,2
2,2	100 LA4	1420	14,8	4,9	2	81,4	0,80	81,9	5,1	2,2	2,4	56	0,0073	21,0
3		1420	20,2	6,4	2	83,4	0,81	84,4	5,2	2,4	2,6	56	0,0090	24,8
4	112 M4	1425	27	8,6	2	84,2	0,80	84,8	5,6	2,6	2,9	56	0,0115	31
4,8		1430	32	10,2	2	85,0	0,80	84,2	6,0	2,6	2,8	56	0,1320	35
5,5	132 SA4	1440	36	11,4	2	85,7	0,81	86,1	6,2	2,1	2,5	58	0,0238	42
7,5		1450	49	15,3	2	87,9	0,81	88,2	6,7	2,5	2,9	58	0,0300	52
9		1455	59	17,8	n.c.	88,0	0,83	88,0	7,4	2,7	2,9	58	0,0338	58
11	A4C 160 M4	1460	72	22,5	2	88,6	0,80	88,7	5,2	2,0	2,1	65	0,063	74
15		1460	98	30,0	2	89,8	0,80	89,9	5,9	2,3	2,4	65	0,075	88
18,5	180 M4	1465	120	37	2	90,2	0,80	90,3	6,2	2,3	2,5	65	0,09	100
22		1465	143	42	2	90,8	0,83	91,0	6,3	2,4	2,5	69	0,11	122
30	200 L4	1465	195	58	2	91,6	0,82	91,7	6,6	2,4	2,8	69	0,18	146
37	225 S4	1470	240	68	2	93,1	0,85	93,1	6,5	2,3	2,8	74	0,32	207
45		1475	291	80	2	93,4	0,87	93,7	6,5	2,4	2,8	74	0,41	230
55	250 M4	1475	356	97	2	93,7	0,88	93,9	6,4	2,3	2,6	74	0,52	264
75	280 S4	1480	483	135	2	93,7	0,86	93,9	7,0	2,5	2,3	77	0,89	362
90		1480	580	157	2	94,5	0,88	94,6	7,1	2,7	2,4	77	1,06	427
110		1480	709	193	n.c.	94,7	0,87	94,3	7,1	2,6	2,4	77	1,15	455
132	B4C 315 MA4	1485	848	239	n.c.	94,9	0,84	94,5	6,2	2,6	2,5	78	2,1	739
160		1485	1028	286	n.c.	95,1	0,85	94,7	6,3	2,5	2,5	78	2,5	812
200		1485	1285	353	n.c.	95,2	0,86	95,0	6,5	2,5	2,6	78	3,1	918
200		1485	1286	353	n.c.	95,3	0,86	95,0	6,9	2,6	2,7	78	3,4	990
250	B5C 355 LA4	1490	1601	440	n.c.	95,5	0,86	95,0	6,2	2,0	2,4	79	6,1	1690
315		1490	2017	554	n.c.	95,6	0,86	95,1	6,2	2,0	2,4	79	7,4	1880
355		1490	2273	624	n.c.	95,6	0,86	95,2	6,2	1,9	2,3	79	8,3	2100
400		1490	2561	702	n.c.	95,8	0,86	95,3	6,2	1,9	2,4	79	9,4	2250
450		1490	2881	778	n.c.	96,1	0,87	95,5	6,2	1,9	2,3	79	10,2	2360
500		1490	3201	835	n.c.	96,2	0,90	95,7	6,5	1,2	2,8	79	11,2	2430
560	B5C 400 LA4	1490	3586	969	n.c.	96,5	0,87	96,5	6,6	2	2,3	81	11,4	2700
630		1490	4034	1083	n.c.	96,6	0,87	96,6	6,6	2	2,4	81	13,0	2900
710		1490	4543	1220	n.c.	96,7	0,87	97,0	6,9	0,9	2,5	81	18,0	3100

n.c. - Rated output excluded by CEMEP agreement,

• - Not included in EN 50347 standards (high output design),

T<sub>MAX</sub>: Breakdown torque, T<sub>s</sub> Starting torque, I<sub>s</sub> Starting current



RATED OUTPUT	MOTOR TYPE	SPEED	PERFORMANCE AT RATED OUTPUT				POWER FACTOR	EFFICIENCY 3/4 (LOAD)	FOR D.O.L. STARTING		BREAKDOWN TORQUE	SOUND PRESSURE LEVEL	MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)
			TORQUE	CURRENT (400V)	EFFICIENCY $\eta$ CLASS				Is/In	Ts/Tn				
kW		rpm min <sup>-1</sup>	T <sub>n</sub> Nm	I <sub>n</sub> A	eff	%	cos $\varphi$	$\eta$	p.u.	p.u.	T <sub>max</sub> /T <sub>n</sub> p.u.	L <sub>PA</sub> dB(A)	J kgm <sup>2</sup>	Approx. kg

**600 min<sup>-1</sup> = 10 poles - 50Hz**

55	B4C 315 MA10	590	889	111	n.c.	92,0	0,78	91,9	5,0	1,4	2,6	74	4,00	735
75	315 MC10	590	1213	149	n.c.	92,0	0,79	92,1	4,8	1,2	2,5	74	4,70	815
90	315 MD10	590	1455	177	n.c.	93,0	0,79	93	4,5	1,1	2,3	74	5,50	883
110	B5C 355 LA10	590	1779	210	n.c.	93,5	0,78	93,4	4,7	1,1	2,4	70	12,0	1710
132	355 LB10	590	2134	251	n.c.	94,0	0,78	94	4,9	1,2	2,4	70	14,3	1910
160	355 LC10	590	2587	299	n.c.	94,4	0,77	94,4	5,1	1,2	2,5	70	17,0	2240
180	355 LD10	590	2911	336	n.c.	94,5	0,78	94,4	5,1	1,2	2,5	70	18,2	2390
250	B5C 400 LA10	593	4022	487	n.c.	95,0	0,78	95,0	4,3	1,2	2,4	73	23	2680
280	400 LB10	593	4505	545	n.c.	95,2	0,78	95,1	4,6	1,3	2,5	73	27	2850
315	400 LC10	593	5068	612	n.c.	95,3	0,78	95,2	4,6	1,3	2,5	73	29	3070

RATED OUTPUT	MOTOR TYPE	SPEED	PERFORMANCE AT RATED OUTPUT				POWER FACTOR	EFFICIENCY 3/4 (LOAD)	FOR D.O.L. STARTING		BREAKDOWN TORQUE	SOUND PRESSURE LEVEL	MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)
			TORQUE	CURRENT (400V)	EFFICIENCY $\eta$ CLASS				Is/In	Ts/Tn				
kW		rpm min <sup>-1</sup>	T <sub>n</sub> Nm	I <sub>n</sub> A	eff	%	cos $\varphi$	$\eta$	p.u.	p.u.	T <sub>max</sub> /T <sub>n</sub> p.u.	L <sub>PA</sub> dB(A)	J kgm <sup>2</sup>	Approx. kg

**500 min<sup>-1</sup> = 12 poles - 50Hz**

45	B4C 315 MA12	490	876	94	n.c.	91,0	0,76	90,7	4,8	1,5	2,4	74	4,00	735
55	315 MC12	490	1071	112	n.c.	92,0	0,77	92	5,2	1,4	2,5	74	4,70	815
75	315 MD12	490	1460	153	n.c.	92,0	0,77	92	4,3	1,2	2,1	74	5,50	883
90	B5C 355 LA12	490	1752	182	n.c.	93,0	0,77	92,8	5,3	1,6	2,6	70	12,0	1710
110	355 LB12	490	2142	218	n.c.	93,5	0,78	93,4	5,3	1,7	2,6	70	15,2	1910
132	355 LC12	490	2570	262	n.c.	93,5	0,78	93,3	5,4	1,7	2,6	70	18,2	2240
150	355 LD12	495	2891	297	n.c.	93,5	0,78	93,4	5,7	1,7	2,8	70	20,7	2390
180	B5C 400 LA12	494	3476	378	n.c.	94,1	0,73	93,7	4,7	1,5	2,5	73	28	2680
200	400 LB12	495	3855	420	n.c.	94,2	0,73	93,8	5,0	1,6	2,6	73	32	2850
225	400 LC12	495	4336	471	n.c.	94,4	0,73	94,0	4,9	1,6	2,6	73	34	3070

n.c. - Rated output excluded by CEMEP agreement,

• - Not included in EN 50347 standards (high output design),

T<sub>MAX</sub>: Breakdown torque, T<sub>S</sub> Starting torque, I<sub>S</sub> Starting current



## DOUBLE SPEED MOTORS FOR PUMP AND FAN APPLICATIONS

1500/750 min<sup>-1</sup> = 4/8 poles - 50Hz - single winding - YY / Y connection

RATED OUTPUT		MOTOR TYPE	SPEED		TORQUE		CURRENT (400V)		EFFICIENCY		POWER FACTOR		FOR D.O.L. STARTING				BREAKDOWN TORQUE		MOMENT OF INERTIA	WEIGHT IM 1001 (IMB3)
kW	4 poles		rpm min <sup>-1</sup>	T <sub>n</sub> Nm	I <sub>n</sub> A	η %	cos φ	I <sub>s</sub> /I <sub>n</sub> p.u.	T <sub>s</sub> /T <sub>n</sub> p.u.	T <sub>max</sub> /T <sub>n</sub> p.u.	J kgm <sup>2</sup>	Approx. kg								
1,3	0,25	MAD-FP 90 S4/8 90 L4/8	1335	640	9	3,7	3,2	1,1	73,5	53,2	0,81	0,62	4,5	2,5	2,0	1,6	2,0	-	0,004	15
1,5	0,3		1370	655	10	4,4	3,6	1,2	76	55	0,8	0,65	4,8	2,7	2,2	1,8	2,2	-	0,0048	17,2
2	0,45	100 LA4/8 100 LB4/8	1365	670	14	6,4	4,8	1,9	73	59,5	0,83	0,59	4,4	2,8	1,8	1,4	2,0	1,6	0,0073	21
2,8	0,6		1390	685	19	8,4	6,4	2,3	77	62,5	0,82	0,6	5,1	2,9	2,0	1,6	2,2	1,8	0,009	24,9
3,5	0,75	112 M4/8	1410	700	24	10,2	7,7	2,8	80	65	0,82	0,6	5,9	3,0	2,2	1,8	2,5	1,9	0,0115	31
5	1	132 S4/8 132 MA4/8 132 MB4/8	1450	725	33	13,2	11,1	4,1	80,5	68,5	0,81	0,51	5,8	3,8	1,9	1,4	2,6	1,6	0,024	42
6,2	1,3		1455	730	41	17,0	13,8	5,3	82	71,3	0,79	0,5	6,8	4,2	2,2	1,6	2,8	1,7	0,03	52
7	1,5		1460	730	46	19,6	15,1	5,8	83,5	72,7	0,8	0,51	7,1	4,4	2,3	1,5	3,0	1,8	0,034	58
10	2,2	A4D-FP 160 M4/8 160 L4/8	1460	730	65	29	21,6	8,0	84,6	75	0,79	0,53	5,6	3,2	2,2	1,8	2,5	2,2	0,0625	74
13	2,8		1465	730	85	37	27,7	10,2	86	76,5	0,79	0,52	6,0	3,4	2,3	2,0	2,6	2,3	0,075	88
16	3,5	180 M4/8 180 L4/8	1465	730	104	46	33,4	12,3	86,5	77,5	0,8	0,53	6,0	3,5	2,4	1,9	2,6	2,5	0,09	74
18	4,5		1465	735	117	58	35	14,6	89,7	78,2	0,82	0,52	6,5	3,7	2,1	1,8	2,5	2,0	0,11	88
25	6,2	200 L4/8	1465	735	163	80	49	18,9	88,5	83	0,83	0,57	6,3	4,0	2,0	1,9	2,4	2,1	0,18	146
32	8	225 S4/8 225 M4/8	1480	740	206	103	61	23,2	91,5	86	0,83	0,58	7,7	5,3	2,2	2,0	2,6	2,5	0,32	207
40	10		1480	740	258	129	75	28,3	92,2	86,5	0,84	0,59	7,7	5,3	2,4	2,0	2,6	2,4	0,41	230
50	12	250 M4/8	1480	740	322	155	94	35,6	92,6	87	0,83	0,56	8,2	5,4	2,6	2,2	2,8	2,8	0,32	264
55	13	280 S4/8 280 M4/8	1480	740	355	168	96	28,4	92,8	88,2	0,89	0,75	6,5	5,5	1,9	1,7	2,3	2,4	1,05	356
65	16		1480	740	419	206	112	33,9	93,1	88,6	0,9	0,77	6,3	5,1	2,0	1,8	2,5	2,2	1,25	388
80	19	315 S4/8	1480	740	516	245	136	41,1	93,6	89	0,91	0,75	6,9	5,7	2,2	1,8	2,7	2,4	1,6	459
100	25	B4D-FP 315 MB4/8 315 MC4/8 315 MD4/8	1480	740	645	322	171	51,4	93,8	90,1	0,9	0,78	6,0	5,0	1,4	1,6	2,0	1,8	3	758
120	30		1485	740	771	387	207	63	94,1	91,2	0,89	0,76	7,4	5,9	1,7	2,0	2,4	2,2	3,6	848
150	37		1485	740	964	477	255	75	94,4	91,8	0,9	0,78	7,1	5,7	1,7	1,9	2,3	2,0	4,4	953

## MECHANICAL TOLERANCES

Overall dimensions in mm of the different motor frame sizes and types are indicated in the following pages. They are also valid for derived types. Some tolerances, in accordance with IEC 60072-1, are indicated in the following table.

 127

The second sbatt extension is built only on request.

Part	Dimension	Tolerance
Shaft extension	D-DA	from 11 to 28mm Ø j6 / 38 to 48mm Ø k6 / 55 to 100mm Ø m6
Key	F-FA	h9
Flange concentricity	N	up to frame size 132 j6 / greater than 132 h6
Shaft height	H	up to framesize 250 - 0,5mm / greater than 250 - 1mm.

## TAPPED HOLES IN THE SHAFT EXTENSION

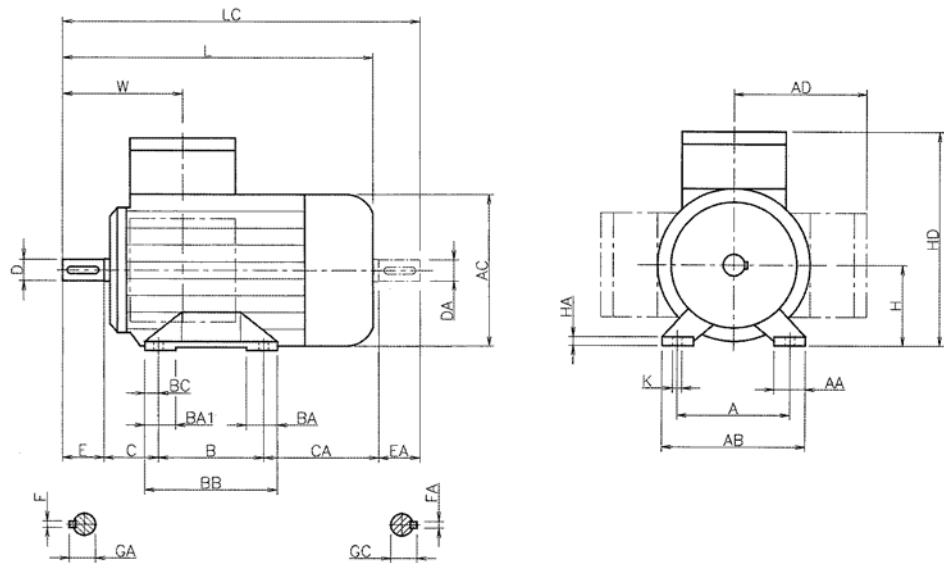
The following table contains information of the tapped holes in the shaft extension, as per DIN 332.

Frame size	D-end	N-end
71	M5	M5
80	M6	M6
90	M8	M8
100	M10	M10
112		
132	M12	M12
160	M16	M16
180		
200		
225	M20	M20
250-280-315		
355-400 (2poles)		
355-400 (≥4poles)		
	M24	

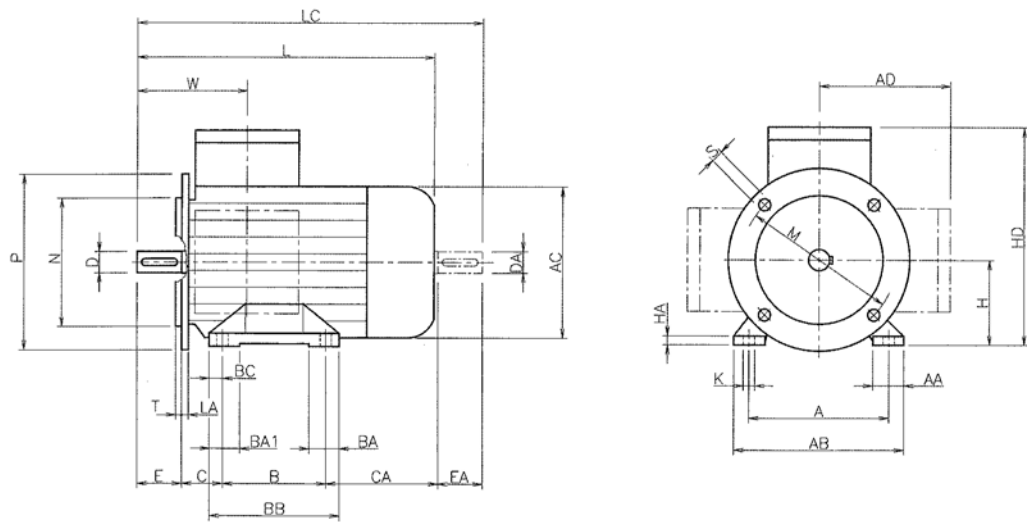
## DIMENSIONS

### MA 63 - 132

#### IM B3 IM 1001



#### IM B35 IM 2001



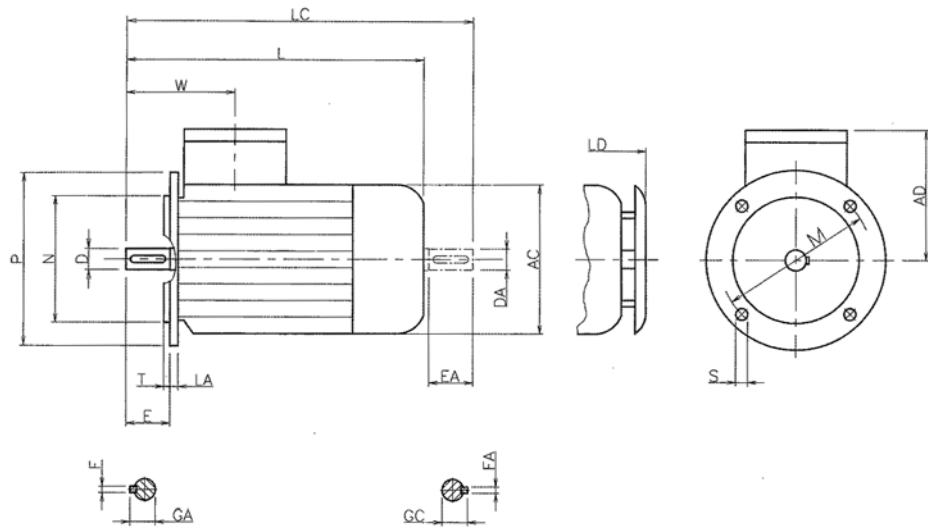
Frame Size	Poles	A	AA	AB	AC	AD	B	BA	BA1	BB	BC	C	CA	H	HA	HD	K	L
MA 63	2 - 8	100	23	120	122	-	80	26	26	100	10	40	67	63	7	164	7	208
MA 71	2 - 8	112	27	136	137	-	90	28,5	28,5	110	10	45	77	71	7	178	7	240
MA 80	2 - 8	125	32	155	158	-	100	32,5	32,5	125	12,5	50	82	80	8	198	9	270
MA 90 S	2 - 8	140	35	174	177	-	100	58	33	155	15	56	117	90	10	239	9	320
MA 90 L	2 - 8	140	35	174	177	-	125	58	33	155	15	56	92	90	10	239	9	320
MA 100	2 - 8	160	40	194	197	159	140	46	46	180	20	63	140	100	12	259	11	400
MA 112	2 - 8	190	40	224	197	159	140	46	46	180	20	70	133	112	12	271	11	400
MA 132 S	2 - 8	216	44	252	253	184	140	80	42	226	24	89	177	132	16	316	11	482
MA 132 M	2 - 8	216	44	252	253	184	178	80	42	226	24	89	139	132	16	316	11	482

Frame Size	Poles	Shaft Extension										Flange					
		LC	W	D	E	F	GA	DA	EA	FA	GC	LA	M	N	P	S	T
MA 63	2 - 8	233	93	11	23	4	12,5	11	23	4	12,5	10	115	95	140	9	3
MA 71	2 - 8	272	99	14	30	5	16	14	30	5	16	10	130	110	160	9	3,5
MA 80	2 - 8	312	116	19	40	6	21,5	19	40	6	21,5	12	165	130	200	11	3,5
MA 90 S	2 - 8	373	132	24	50	8	27	24	50	8	27	12	165	130	200	11	3,5
MA 90 L	2 - 8	373	132	24	50	8	27	24	50	8	27	12	165	130	200	11	3,5
MA 100	2 - 8	463	153	28	60	8	31	28	60	8	31	14	215	180	250	14	4
MA 112	2 - 8	463	153	28	60	8	31	28	60	8	31	14	215	180	250	14	4
MA 132 S	2 - 8	566	172	38	80	10	41	38	80	10	41	14	265	230	300	14	4
MA 132 M	2 - 8	566	172	38	80	10	41	38	80	10	41	14	265	230	300	14	4

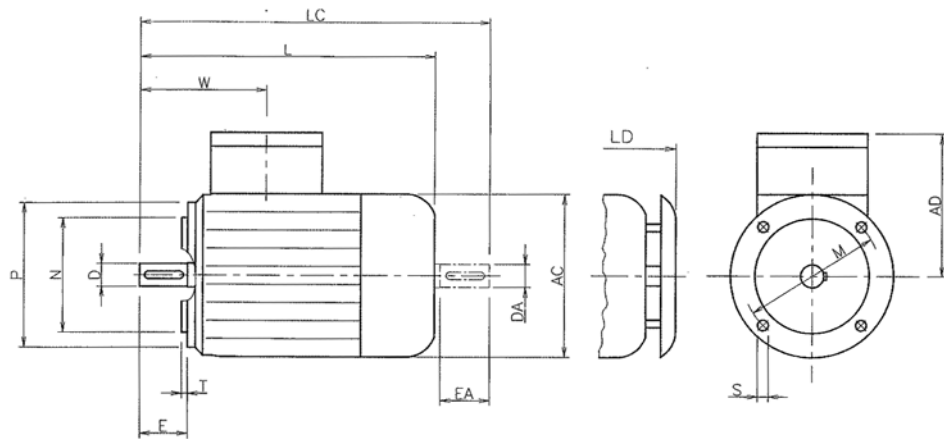
**DIMENSIONS**

**MA 63 - 132**

**IM B5 IM 3001  
IM V1 IM 3011**



**IM B14 IM 3601  
IM V18 IM 3611**

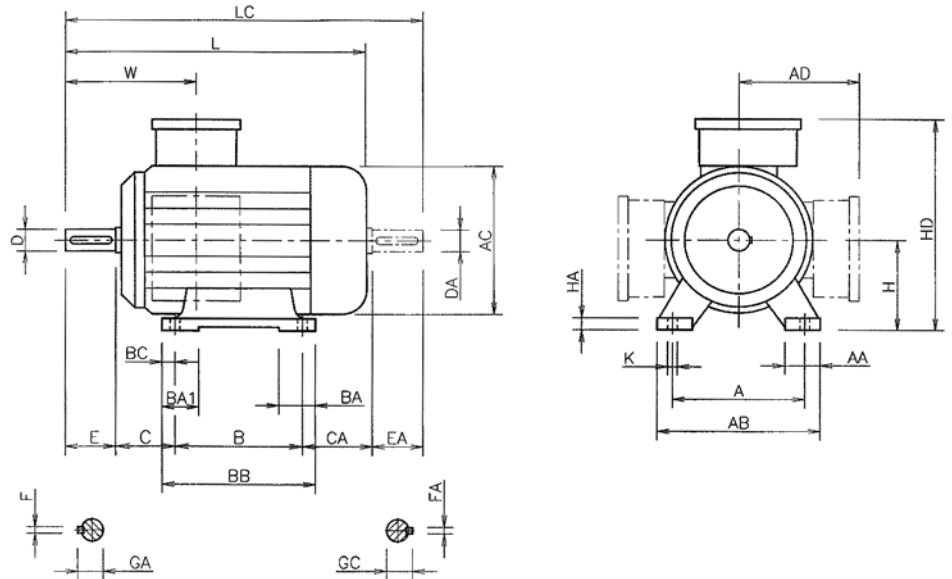


Frame Size	Poles	Flange B5											Flange B14					
		AC	AD	L	LC	LD	W	LA	M	N	P	S	T	M	N	P	S	T
MA 63	2 - 8	122	101	208	233	226	93	10	115	95	140	9	3	75	60	90	M5	2,5
MA 71	2 - 8	137	107	240	272	263	99	10	130	110	160	9	3,5	85	70	105	M6	2,5
MA 80	2 - 8	158	118	270	312	290	116	12	165	130	200	11	3,5	100	80	120	M6	3
MA 90 S	2 - 8	177	149	320	373	345	132	12	165	130	200	11	3,5	115	95	140	M8	3
MA 90 L	2 - 8	177	149	320	373	345	132	12	165	130	200	11	3,5	115	95	140	M8	3
MA 100	2 - 8	197	159	400	463	423	153	14	215	180	250	14	4	130	110	160	M8	3,5
MA 112	2 - 8	197	159	400	463	423	153	14	215	180	250	14	4	130	110	160	M8	3,5
MA 132 S	2 - 8	253	184	482	566	501	172	14	265	230	300	14	4	165	130	200	M10	3,5
MA 132 M	2 - 8	253	184	482	566	501	172	14	265	230	300	14	4	165	130	200	M10	3,5

Frame Size	Poles	Shaft Extension								
		D	E	F	GA	DA	EA	FA	GC	
MA 63	2 - 8	11	23	4	12,5	11	23	4	12,5	
MA 71	2 - 8	14	30	5	16	14	30	5	16	
MA 80	2 - 8	19	40	6	21,5	19	40	6	21,5	
MA 90 S	2 - 8	24	50	8	27	24	50	8	27	
MA 90 L	2 - 8	24	50	8	27	24	50	8	27	
MA 100	2 - 8	28	60	8	31	28	60	8	31	
MA 112	2 - 8	28	60	8	31	28	60	8	31	
MA 132 S	2 - 8	38	80	10	41	38	80	10	41	
MA 132 M	2 - 8	38	80	10	41	38	80	10	41	

**DIMENSIONS**

**A4 160 - 315S**  
**B4 315 M**



**IM B3 IM 1001**

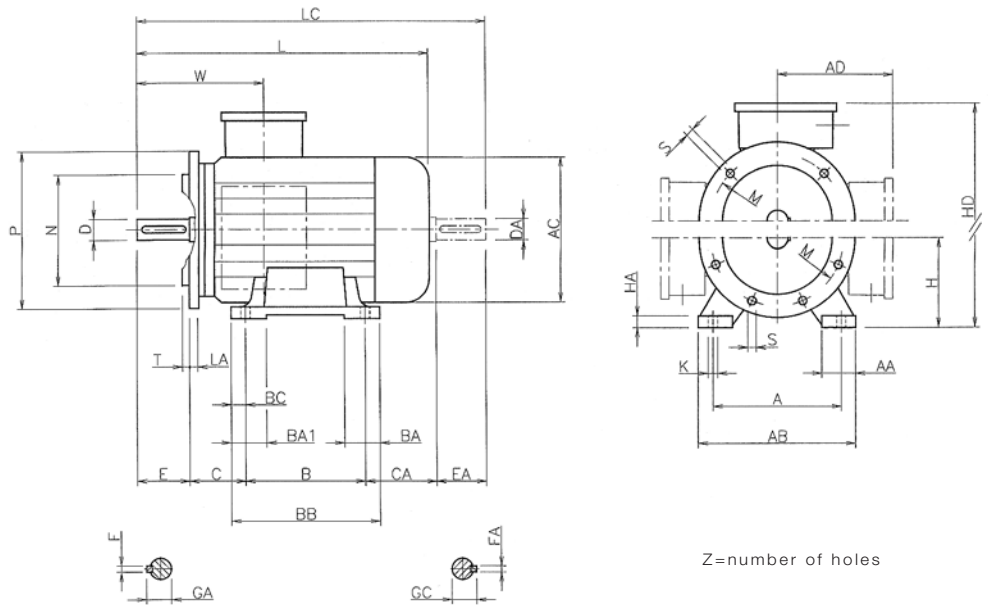
Frame Size	Poles	A	AA	AB	AC	AD	B	BA	BA1	BB	BC	C	CA	H	HA	HD	K	L	
A4C 160	M	2 - 8	254	55	296	314	258	210	90	60	296	21	108	223	160	20	418	14,5	648
	L		254	55	296	314	258	254	90	60	296	21	108	179	160	20	418	14,5	648
A4C 180	M	2 - 4	279	60	321	314	258	241	60	60	283	21	121	179	180	22	458	14,5	648
	L	4 - 8	279	58	320	354	278	279	80	80	320	20,5	121	216	180	22	458	14,5	723
A4C 200	L	2 - 8	318	74	360	354	278	305	70	70	347	21	133	178	200	24	478	18,5	723
A4C 225	S	4 - 8	356	76	405	411	-	286	80	80	360	24,5	149	260	225	28	523	18,5	830
	M	2	356	76	405	411	-	311	80	80	360	24,5	149	235	225	28	523	18,5	800
			4 - 8	356	76	405	411	-	311	80	80	360	24,5	149	235	225	28	523	18,5
A4C 250	M	2	406	90	465	411	-	349	90	90	406	28,5	168	178	250	28	548	22	830
		4 - 8	406	90	465	411	-	349	90	90	406	28,5	168	178	250	28	548	22	830
A4C 280	S	2	457	90	540	490	-	368	110	110	480	30,5	190	272	280	40	640	24	959
		4 - 8	457	90	540	490	-	368	110	110	480	30,5	190	272	280	40	640	24	959
	M	2	457	90	540	490	-	419	110	110	480	30,5	190	221	280	40	640	24	959
		4 - 8	457	90	540	490	-	419	110	110	480	30,5	190	221	280	40	640	24	959
A4C 315	S	4 - 8	508	110	590	490	-	406	110	110	470	32,5	216	208	315	45	675	28	989
B4C 315	SM	2	508	110	590	604	-	406	160	110	520	32	216	299	315	45	765	27	1102
	MA-MC	2	508	110	590	604	-	457	160	110	520	32	216	299	315	45	765	27	1102
	MA-MC	4 - 8	508	110	590	604	-	457	160	110	520	32	216	299	315	45	765	27	1132
	MD	2	508	110	590	604	-	457	160	110	520	32	216	299	315	45	800	27	1102
	MD-ME	4 - 8	508	110	590	604	-	457	160	110	520	32	216	299	315	45	800	27	1132
	ML	2	508	110	590	604	-	457	160	110	520	32	216	299	315	45	800	27	1202
4 - 6		508	110	590	604	-	457	160	110	520	32	216	299	315	45	800	27	1232	

Frame Size	Poles	Shaft Extension										
		LC	W	D	E	F	GA	DA	EA	FA	GC	
A4C 160	M	2 - 8	761	279	42	110	12	45	42	110	12	45
	L		761	279	42	110	12	45	42	110	12	45
A4C 180	M	2 - 4	761	279	48	110	14	51,5	42	110	12	45
	L	4 - 8	836	296	48	110	14	51,5	42	110	12	45
A4C 200	L	2 - 8	836	296	55	110	16	59	42	110	12	45
A4C 225	S	4 - 8	945	318	60	140	18	64	55	110	16	59
	M	2	915	288	55	110	16	59	55	110	16	59
			4 - 8	945	318	60	140	18	64	55	110	16
A4C 250	M	2	945	318	60	140	18	64	55	110	16	59
		4 - 8	945	318	65	140	18	69	55	110	16	59
A4C 280	S	2	1110	350	65	140	18	69	60	140	18	64
		4 - 8	1110	350	75	140	20	79,5	60	140	18	64
	M	2	1110	350	65	140	18	69	60	140	18	64
		4 - 8	1110	350	75	140	20	79,5	60	140	18	64
A4C 315	S	4 - 8	1140	380	80	170	22	85	65	140	18	69
B4C 315	SM	2	1252	387	65	140	18	69	60	140	18	64
	MA-MC	2	1252	387	65	140	18	69	60	140	18	64
	MA-MC	4 - 8	1282	417	80	170	22	85	65	140	18	69
	MD	2	1252	387	70	140	20	74,5	60	140	18	64
	MD-ME	4 - 8	1282	417	90	170	25	95	65	140	18	69
	ML	2	1352	387	70	140	20	74,5	60	140	18	64
4 - 6		1382	417	90	170	25	95	65	140	18	69	



**DIMENSIONS**

**A4 160 - 315S  
B4 315 M**



**IM B35 IM 2001**

Frame Size	Poles	A	AA	AB	AC	AD	B	BA	BA1	BB	BC	C	CA	H	HA	HD	K	L	
A4C 160	M	2 - 8	254	55	296	314	258	210	90	60	296	21	108	223	160	20	418	14,5	648
	L		254	55	296	314	258	254	90	60	296	21	108	179	160	20	418	14,5	648
A4C 180	M	2 - 4	279	60	321	314	258	241	60	60	283	21	121	179	180	22	438	14,5	648
	L	4 - 8	279	58	320	354	278	279	80	80	320	20,5	121	216	180	22	458	14,5	723
A4C 200	L	2 - 8	318	74	360	354	278	305	70	70	347	21	133	178	200	24	478	18,5	723
A4C 225	S	4 - 8	356	76	405	411	-	286	80	80	360	24,5	149	260	225	28	523	18,5	830
	M	2	356	76	405	411	-	311	80	80	360	24,5	149	235	225	28	523	18,5	800
		4 - 8	356	76	405	411	-	311	80	80	360	24,5	149	235	225	28	523	18,5	830
A4C 250	M	2	406	90	465	411	-	349	90	90	406	28,5	168	178	250	28	548	22	830
		4 - 8	406	90	465	411	-	349	90	90	406	28,5	168	178	250	28	548	22	830
A4C 280	S	2	457	90	540	490	-	368	110	110	480	30,5	190	272	280	40	640	24	959
		4 - 8	457	90	540	490	-	368	110	110	480	30,5	190	272	280	40	640	24	959
	M	2	457	90	540	490	-	419	110	110	480	30,5	190	221	280	40	640	24	959
		4 - 8	457	90	540	490	-	419	110	110	480	30,5	190	221	280	40	640	24	959
A4C 315	S	4 - 8	508	110	590	490	-	406	110	110	470	32,5	216	208	315	45	675	28	989
B4C 315	SM	2	508	110	590	604	-	457	160	110	520	32	216	299	315	45	765	27	1102
	MA-MC	2	508	110	590	604	-	457	160	110	520	32	216	299	315	45	765	27	1102
	MA-MC	4 - 8	508	110	590	604	-	457	160	110	520	32	216	299	315	45	765	27	1132
	MD	2	508	110	590	604	-	457	160	110	520	32	216	299	315	45	800	27	1102
	MD-ME	4 - 8	508	110	590	604	-	457	160	110	520	32	216	299	315	45	800	27	1132
	ML	2	508	110	590	604	-	457	160	110	520	32	216	399	315	45	800	27	1202
4 - 6		508	110	590	604	-	457	160	110	520	32	216	399	315	45	800	27	1232	

Frame Size	Poles	Shaft Extension										Flange							
		LC	W	D	E	F	GA	DA	EA	FA	GC	LA	M	N	P	S	T	Z	
A4C 160	M	2 - 8	761	279	42	110	12	45	42	110	12	45	15	300	250	350	18	5	4
	L		761	279	42	110	12	45	42	110	12	45	15	300	250	350	18	5	4
A4C 180	M	2 - 4	761	279	48	110	14	51,5	42	110	12	45	15	300	250	350	18	5	4
	L	4 - 8	836	296	48	110	14	51,5	42	110	12	45	14	300	250	350	18	5	4
A4C 200	L	2 - 8	836	296	55	110	16	59	42	110	12	45	15	350	300	400	18	5	4
A4C 225	S	4 - 8	945	318	60	140	18	64	55	110	16	59	16	400	350	450	18	5	8
	M	2	915	288	55	110	16	59	55	110	16	59	16	400	350	450	18	5	8
		4 - 8	945	318	60	140	18	64	55	110	16	59	16	400	350	450	18	5	8
A4C 250	M	2	945	318	60	140	18	64	55	110	16	59	18	500	450	550	18	5	8
		4 - 8	945	318	65	140	18	69	55	110	16	59	18	500	450	550	18	5	8
A4C 280	S	2	1110	350	65	140	18	69	60	140	18	64	18	500	450	550	18	5	8
		4 - 8	1110	350	75	140	20	79,5	60	140	18	64	18	500	450	550	18	5	8
	M	2	1110	350	65	140	18	69	60	140	18	64	18	500	450	550	18	5	8
		4 - 8	1110	350	75	140	20	79,5	60	140	18	64	18	500	450	550	18	5	8
A4C 315	S	4 - 8	1140	380	80	170	22	85	65	140	18	69	22	600	550	660	22	6	8
B4C 315	SM	2	1252	387	65	140	18	69	60	140	18	64	22	600	550	660	22	6	8
	MA-MC	2	1252	387	65	140	18	69	60	140	18	64	22	600	550	660	22	6	8
	MA-MC	4 - 8	1282	417	80	170	22	85	65	140	18	69	22	600	550	660	22	6	8
	MD	2	1252	387	70	140	20	74,5	60	140	18	64	22	600	550	660	22	6	8
	MD-ME	4 - 8	1282	417	90	170	25	95	65	140	18	69	22	600	550	660	22	6	8
	ML	2	1352	387	70	140	20	74,5	60	140	18	64	22	600	550	660	22	6	8
4 - 6		1382	417	90	170	25	95	65	140	18	69	22	600	550	660	22	6	8	

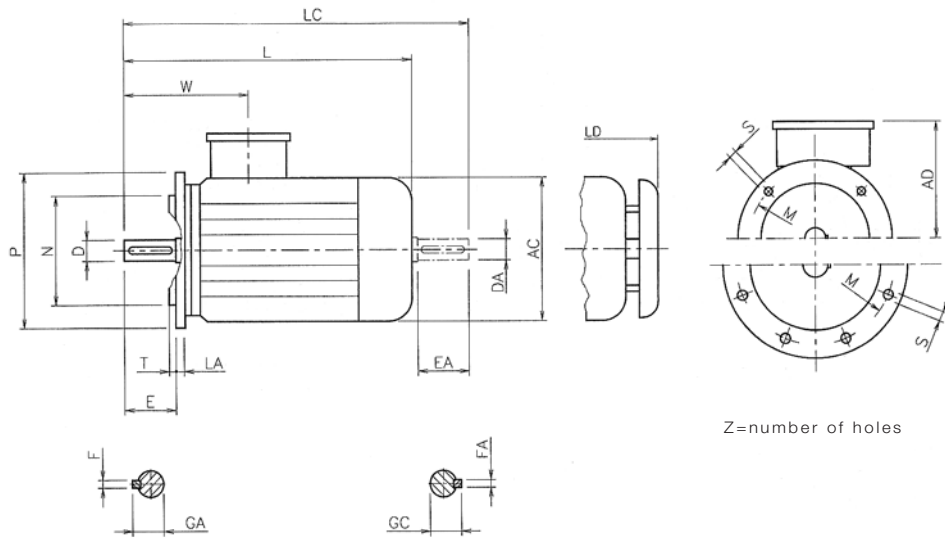
**DIMENSIONS**

**A4 160 - 315S**

**B4 315 M**

**IM B5 IM 3001**

**IM V1 IM 3011**



Z=number of holes

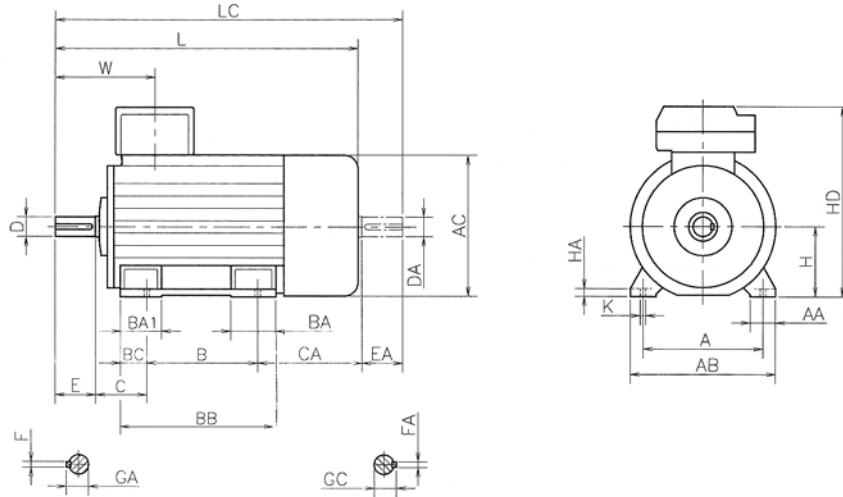
Frame Size	Poles	Flange B5												Shaft Extension									
		AC	AD	L	LC	LD	W	LA	M	N	P	S	T	Z	D	E	F	GA	DA	EA	FA	GC	
A4C 160	M	2 - 8	314	258	648	761	714	279	15	300	250	350	18	5	4	42	110	12	45	42	110	12	45
	L		314	258	648	761	714	279	15	300	250	350	18	5	4	42	110	12	45	42	110	12	45
A4C 180	M	2 - 4	314	258	648	761	714	279	15	300	250	350	18	5	4	48	110	14	51,5	42	110	12	45
	L	4 - 8	354	278	723	836	789	296	14	300	250	350	18	5	4	48	110	14	51,5	42	110	12	45
A4C 200	L	2 - 8	354	278	723	836	789	296	15	350	300	400	18	5	4	55	110	16	59	42	110	12	45
A4C 225	S	4 - 8	411	298	830	945	896	318	16	400	350	450	18	5	8	60	140	18	64	55	110	16	59
	M	2	411	298	800	915	866	288	16	400	350	450	18	5	8	55	110	16	59	55	110	16	59
A4C 250	M	4 - 8	411	298	830	945	896	318	16	400	350	450	18	5	8	60	140	18	64	55	110	16	59
		2	411	298	830	945	896	318	18	500	450	550	18	5	8	60	140	18	64	55	110	16	59
A4C 280	S	2	490	360	959	1110	1044	350	18	500	450	550	18	5	8	65	140	18	69	60	140	18	64
		4 - 8	490	360	959	1110	1044	350	18	500	450	550	18	5	8	75	140	20	79,5	60	140	18	64
	M	2	490	360	959	1110	1044	350	18	500	450	550	18	5	8	65	140	18	69	60	140	18	64
		4 - 8	490	360	959	1110	1044	350	18	500	450	550	18	5	8	75	140	20	79,5	60	140	18	64
A4C 315	S	4 - 8	490	360	989	1140	1074	380	22	600	550	660	22	6	8	80	170	22	85	65	140	18	69
B4C 315	SM	2	604	450	1102	1252	1177	387	22	600	550	660	22	6	8	65	140	18	69	60	140	18	64
	MA-MC	2	604	450	1102	1252	1177	387	22	600	550	660	22	6	8	65	140	18	69	60	140	18	64
	MA-MC	4 - 8	604	405	1132	1282	1207	417	22	600	550	660	22	6	8	80	170	22	85	65	140	18	69
	MD	2	604	485	1102	1252	1177	387	22	600	550	660	22	6	8	70	140	20	74,5	60	140	18	64
	MD-ME	4 - 8	604	485	1132	1282	1207	417	22	600	550	660	22	6	8	90	170	25	95	65	140	18	69
	ML	2	604	485	1202	1352	1277	417	22	600	550	660	22	6	8	70	140	20	74,5	60	140	18	64
4 - 6		604	485	1232	1382	1307	417	22	600	550	660	22	6	8	90	170	25	95	65	140	18	69	

**DIMENSIONS**

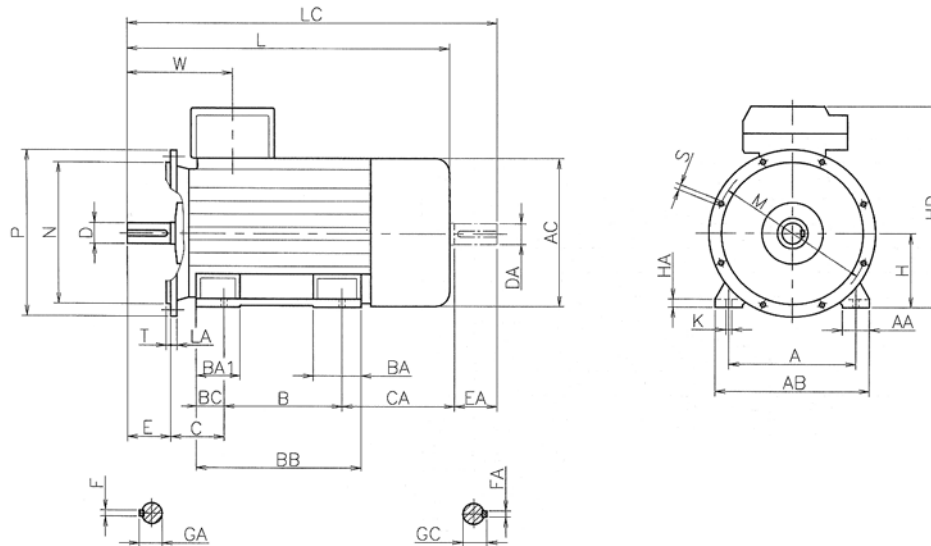
**B5 355**

**B5 400**

**IM B3 IM 1001**



**IM B35 IM 2001**



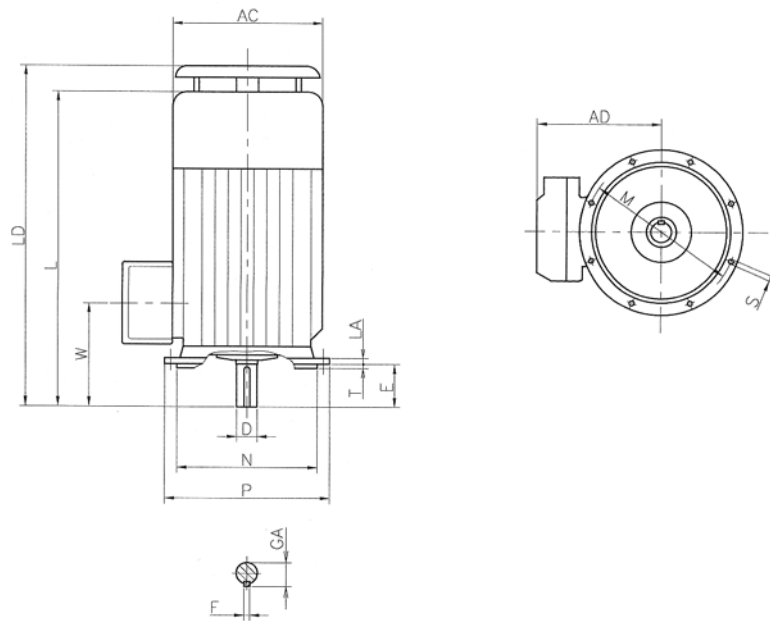
Frame Size	Poles	A	AA	AB	AC	B	BA	BA1	BB	BC	C	CA	H	HA	HD	K	L	LC	W	
B5C 355	LA-LB	2	610	130	740	770	630	228	208	818	133	254	456	355	40	962	28	1475	1620	435
	4 - 12	610	130	740	770	630	228	208	818	133	254	456	355	40	962	28	1545	1690	505	
	LC-LF	2	610	130	740	770	630	313	208	1018	133	254	656	355	40	962	28	1675	1820	435
	4 - 12	610	130	740	770	630	313	208	1018	133	254	656	355	40	962	28	1745	1890	505	
B5C 400	LA-LC	2	686	140	830	850	710	458	-	1239	155	280	785	400	42	1057	35	1910	2055	455
	LA-LD	4 - 8	686	140	830	850	710	458	-	1239	155	280	785	400	42	1057	35	1980	2055	525

Frame Size	Poles	Shaft Extension								Flange B5						
		D	E	F	GA	DA	EA	FA	GC	LA	M	N	P	S	T	
B5C 355	LA-LB	2	75	140	20	79,5	75	140	20	79,5	25	740	680	800	24	6
	4 - 8	100	210	28	106	75	140	20	79,5	25	740	680	800	24	6	
	LC-LF	2	75	140	20	79,5	75	140	20	79,5	25	740	680	800	24	6
	4 - 8	100	210	28	106	75	140	20	79,5	25	740	680	800	24	6	
B5C 400	LA-LC	2	75	140	20	79,5	75	140	20	79,5	28	940	880	1000	28	6
	LA-LD	4 - 8	100	210	28	106	75	140	20	79,5	28	940	880	1000	28	6

## DIMENSIONS

**B5 355**  
**B5 400**

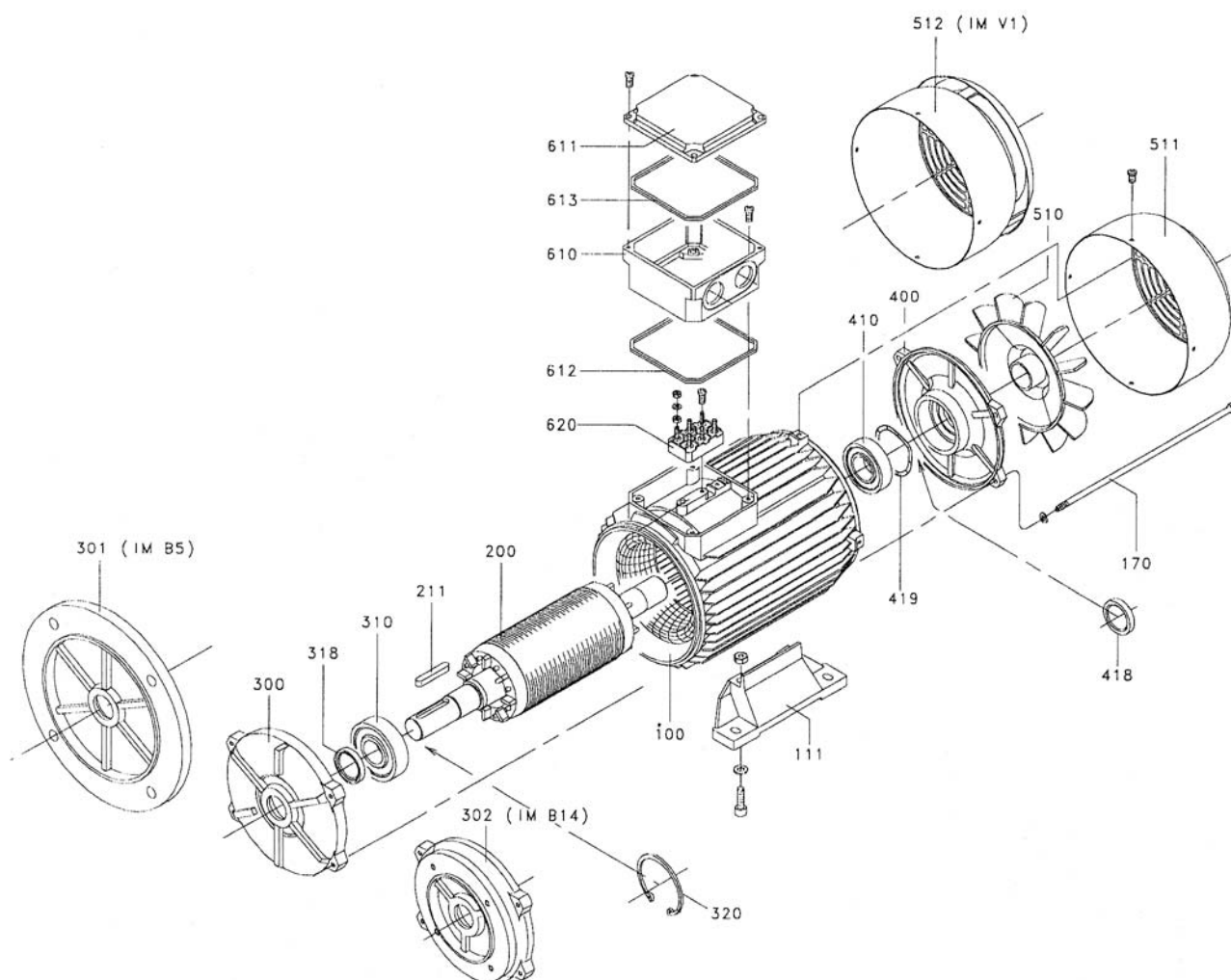
**IM V1 IM 3011**



Frame Size	Poles	Flange B5											
		AC	AD	L	LD	W	LA	M	N	P	S	T	
B5C 355	LA-LB	2	770	607	1475	1595	435	25	740	680	800	24	6
		4 - 12	770	607	1545	1665	505	25	740	680	800	24	6
	LC-LF	2	770	607	1675	1795	435	25	740	680	800	24	6
		4 - 12	770	607	1745	1865	505	25	740	680	800	24	6
B5C 400	LA-LC	2	850	657	1910	2030	455	28	940	880	1000	28	6
	LA-LD	4 - 8	850	657	1980	2100	525	28	940	880	1000	28	6

Frame Size	Poles	Shaft Extension								
		D	E	F	GA	DA	EA	FA	GC	
B5C 355	LA-LB	2	75	140	20	79,5	75	140	20	79,5
		4 - 12	100	210	28	106	75	140	20	79,5
	LC-LF	2	75	140	20	79,5	75	140	20	79,5
		4 - 12	100	210	28	106	75	140	20	79,5
B5C 400	LA-LC	2	75	140	20	79,5	75	140	20	79,5
	LA-LD	4 - 8	100	210	28	106	75	140	20	79,5

**PART NAME 63-132**



- |                                   |                      |                        |
|-----------------------------------|----------------------|------------------------|
| 100 Casing with wound stator pack | 302 Endshield, IMB14 | 511 Fan cowl, IBM3     |
| 111 Feet                          | 310 Bearing, D-end   | 512 Fan cowl, IMV1     |
| 170 Tie rod                       | 318 Seal ring, D-end | 610 Terminal box       |
| 200 Rotor with shaft              | 400 Endshield, N-end | 611 Terminal box cover |
| 210 Key                           | 410 Bearing, N-end   | 612 Gasket             |
| 300 Endshield, IMB3               | 419 Preload washer   | 613 Gasket             |
| 301 Endshield, IMB5               | 510 Fan              | 620 Terminal board     |

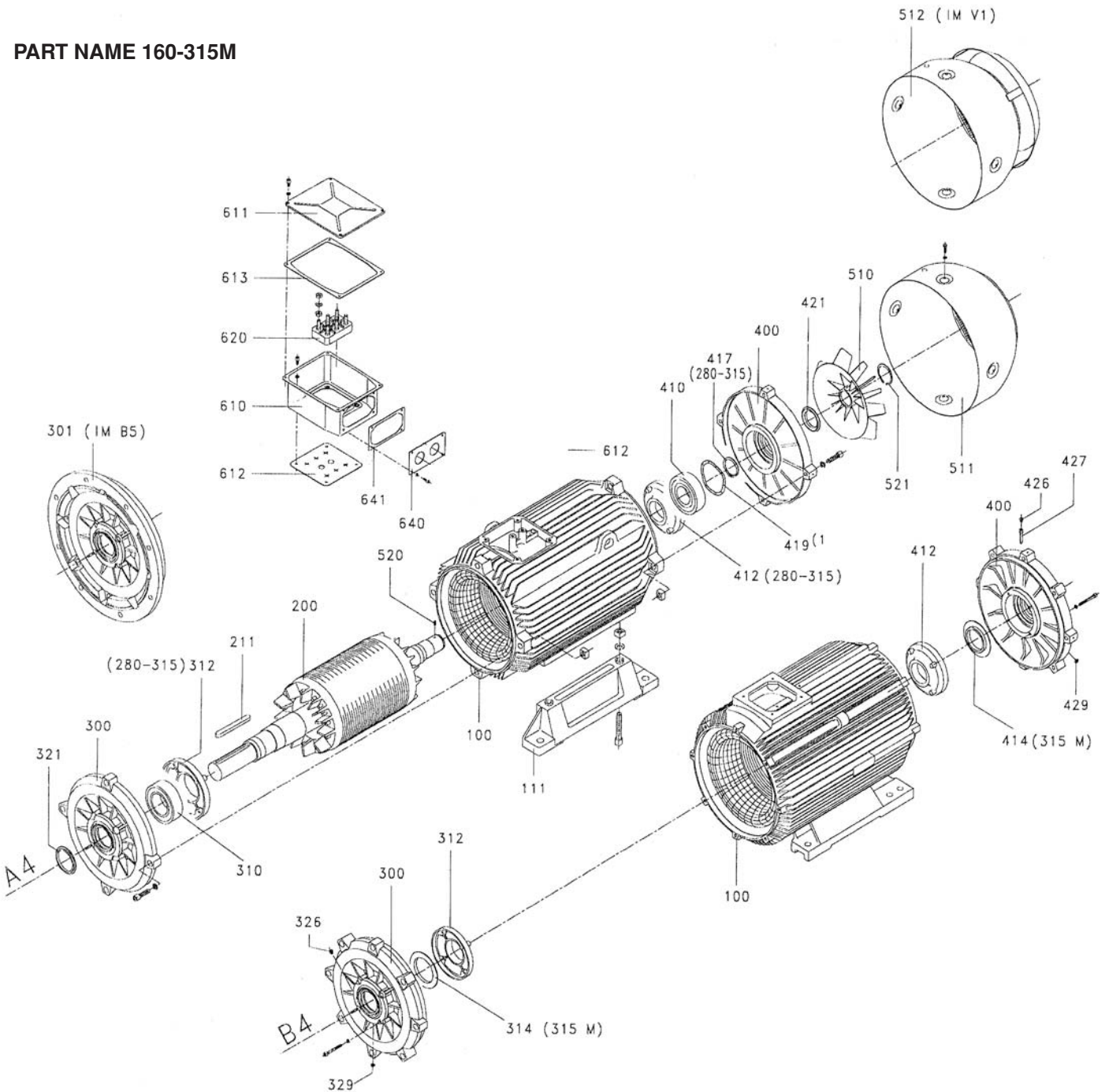
**Standard Design**

Delivered motors may differ in details from those illustrated.

1) Only upon request

- 320 Retaining ring, D-end
- 418 Seal ring, N-end

**PART NAME 160-315M**



- |                                   |                              |                           |                        |
|-----------------------------------|------------------------------|---------------------------|------------------------|
| 100 Casing with wound stator pack | 321 Slinger, D-end           | 421 Slinger, N-end        | 610 Terminal box       |
| 111 Feet                          | 326 Lubricating nipple       | 426 Lubricating nipple    | 611 Terminal box cover |
| 200 Rotor with shaft              | 329 Exhausted grease plug    | 427 Grease pipe           | 612 Gasket             |
| 211 Key                           | 400 Endshield, N-end         | 429 Exhausted grease plug | 613 Gasket             |
| 300 Endshield, IMB3               | 410 Bearing, N-end           | 510 Fan                   | 620 Terminal board     |
| 301 Endshield, IMB5               | 412 Inner bearing cap, N-end | 511 Fan cowl, IMB3        | 640 Cable gland plate  |
| 310 Bearing, D-end                | 414 Grease slinger, N-end    | 512 Fan cowl, IMV1        | 641 Gasket             |
| 312 Inner bearing cap, D-end      | 417 Retaining ring           | 520 Pin                   |                        |
| 314 Grease slinger, D-end         | 419 Preload washer           | 521 Retaining ring        |                        |

D-end - driver end  
N-end - non-driver end

**Standard Design**

Delivered motors may differ in details from those illustrated.

## OPTION CODES

N	Option	Size Where Applicable	Page
100	Insulation class H	63 - 400	7
103	N° 9 terminals	63 - 400	/
103	N° 12 terminals	63 - 400	/
104	Flying leads L = 1000 mm	63 - 400	/
107	Tropicalisation	63 - 400	9
108	Anticondensation heaters, with terminals in main terminal box	100 - 400	24
109	Anticondensation heaters, with terminals in auxiliary terminal box	160 - 400	24
110	Bi-metal cut-out switch with terminals in main terminal box	63 - 315	25, 26
111	PTC thermistors with terminals in main terminal box	63 - 400	25, 26
112	PT100 thermodetectors with terminals in main terminal box	160 - 400	25, 26
113	Bi-metal cut-out switch with terminals in auxiliary terminal box	160 - 315	25, 26
114	PTC thermistors with terminals in auxiliary terminal box	160 - 400	25, 26
115	PT100 thermodetectors with terminals in main terminal box	160 - 400	25, 26
122	Thermodetectors PT100 in bearings	280 - 400	26
125	IP56 degree of protection	63 - 400	7
127	Second shaft end	63 - 400	47
128	Sealed bearings	63 - 250	/
129	Roller bearing on D-end	160 - 250 355 - 400	20
130	Oil seal	63 - 400	/
131	Drainage hole with tap	63 - 400	24
132	R grade vibration level	63 - 400	12
133	S grade vibration level	63 - 400	12
134	Metallic fan	63 - 315	/
135	Fan cover for textile manufacturers	160 - 250	/
137	Low temperature duty -25°C. -40°C	63 - 400	/
138	D-end and N-end greasing nipples	160 - 250	14
139	Arrangement for SPM	160 - 400	/
154	Arrangement for tachometer	160 - 400	/
159	Complete with tachometer	160 - 315	/
160	Arrangement for encoder standard type	100 - 400	/
161	Complete with encoder standard type	100 - 400	/
170	Anti rain canopy	63 - 400	/
175	Insulated N-end bearing	280 - 400	33
177	Forced ventilation	100 - 400	11, 32
178	Enhanced insulation system for Inverter application	315M - 400	33
179	Special fan for reduced noise level	225 - 400	13
304	Special voltage and/or frequency	63 - 400	38
312	Special cable entry	63 - 400	/
313	Brass cableglands	63 - 400	/
919	Non-standard RAL paint colour - (Std = RAL 5010)	63 - 400	9
930	Special painting process for aggressive environments	63 - 400	9


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